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Rubber Suspension

By A. S. Krotz
Development Engineer, B. F. Goodrich Co.

THE application of rubber to the suspension of vehicles offers interesting possibilities and has progressed to the point where it has attractive potentialities for large scale production. There are many ways of designing rubber springs and this paper outlines some advantages and indicates the limitations in one such system, and describes the approach to the problem which we believe bridges the gap between the technical rubber man and the automotive engineer and may be useful in other rubber problems as well.

The torsion spring presents distinct advantages not only in its characteristics as a spring but also in flexibility of application which makes it possible to meet a wide range of requirements by variations in spring design and in the length of the moment arm which applies the torsional load.

Figure 1 shows an example of the "Torsilastic" spring. It is in general a torsion type spring having an inner shaft, surrounded by an annular layer of rubber, and a metal shell around the outside. The parts of the spring are: (1) Inner shaft; (2) Outer shell; and (3) Cylinder of rubber bonded to shaft and shell.

The outer shell is split, in this case, into two 180° segments. The split shell serves three major purposes: First, to permit high pressures to be applied to the bond between rubber and metal during cure (this has proved to be very necessary in obtaining satisfactory adhesion); second, to permit the rubber to shrink, after cure, without causing internal tension; and third, by compressing the split shell down to a somewhat smaller diameter than in its free, cold state, to permit placing the rubber and the rubber-to-metal bond under radial compression, which our test work has shown improves materially the life of the bushing.

The spring is stressed in torsion by anchoring either the shaft or the outside shell to the chassis and rotating the other member. These springs are inherently resistant to any sort of misalignment, as shown later, and are well suited to serve not only as an elastic medium or spring but also to form a bearing or locating device for the wheel support arms or linkage.

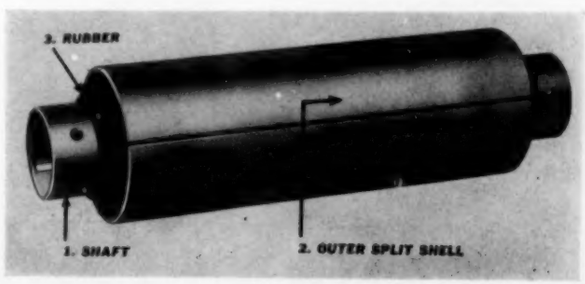


FIG. 1—Torsilastic Spring.

Note: This paper was presented at the May 1, 1939, meeting of the Detroit Section of the Society of Automotive Engineers, and is reproduced in practically complete form with the permission of the Society. It is the first publication of the paper, although later publications may be made.

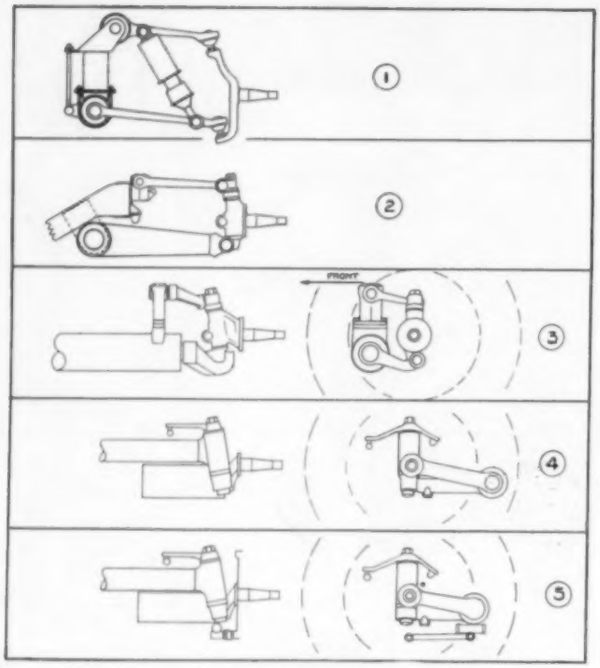


FIG. 2—Suspension Types.

(1) Wishbone type with two Torsilastic springs per wheel and balls replacing king pin. (2) Wishbone type with one Torsilastic spring per wheel. (3) Longitudinal arm type with moving king pin. (4) Longitudinal arm type with fixed king pin and no brake reaction pin. (5) Longitudinal arm type with fixed king pin and with brake reaction arm.

When used in this way, that is as a torsion spring and as a mounting, the Torsilastic spring eliminates bearings which would otherwise be necessary and effectively insulates the road wheels from the chassis. Under these conditions the Torsilastic spring can be so applied in the chassis as to obtain the following advantages:—

(1) Reduction in "harshness" of ride due to the slight flexibility in the rubber acting as a bearing; (2) Lowered noise level due to insulating properties of the rubber; (3) Elimination of bearings, bearing parts, spring seats and mountings; (4) Reduction of static friction to a minimum due to elimination of bearings; (5) Freedom from lubrication, rattles and squeaks; (6) Cleanness and simplicity of design with low weight, due to parts eliminated; (7) No possibility of sudden failure in the rubber as in steel springs; (8) Reduction of impact loads on suspension members due to the rubber forming its own bearing.

Such a spring can be made into a small, light unit that is cheap and without objectionable characteristics. Since it is possible to show distinct advantages over a comparable steel spring, in many applications, the price consideration becomes less important; however, the influence of price should not be underemphasized. While the spring itself costs slightly more than a steel spring, comparisons of cost can be made only on the basis of the complete suspension assembly.

The rubber spring assembly shown in Fig. 1 contains 3.3 pounds of rubber and replaced a highly stressed coil spring weighing 11.5 pounds. The shaft or inner tube weighs 3.69 pounds, and the outer split shell weighs 3.75 pounds. Total weight is 10.75 pounds. As compared with the steel spring this weight represents the spring itself, the spring seats and mountings, and the support arm bearings. The 3/32" split shell can be reduced to 1/16" where some form of outer housing is used.

There are so many ways in which these springs can be used in the suspension of vehicles that it was decided to limit this paper to the rubber spring unit. However, as an indication of some possible suspension types, Figure 2 is a rough sketch of: (1) Wishbone type front suspension using two rubber springs per wheel; (2) Wishbone type using one rubber spring per wheel and taking brake reaction on the rubber bushing; (3) Called "Mathis" type; (4) Called "Vauxhall" type; (5) Called "Opel Dubonnet" type. There are many other ways of applying these springs to automobile chassis and there also is a large range of interesting applications to railroad and street car suspension.

In considering the application of rubber torsion springs to any passenger car chassis the logical place to start is with the chassis limitations. It is assumed that distribution of mass is already fixed by necessity or preference. Static deflection of front and rear springs can usually be determined by these same considerations and by any experience with past models

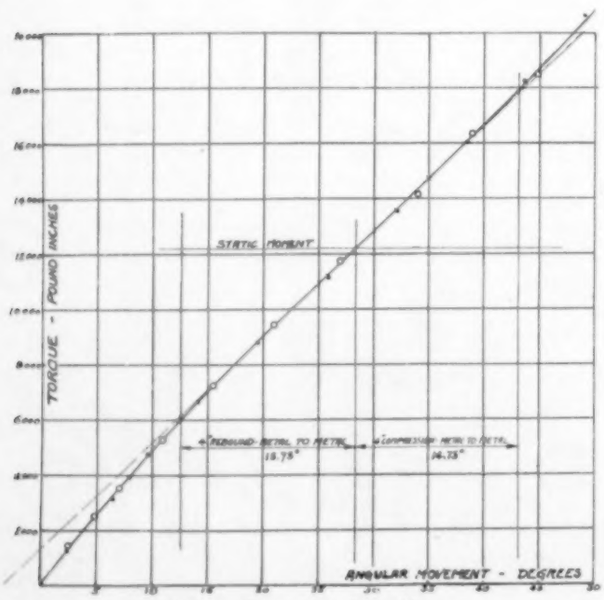


FIG. 3—Torsional Loading Curve.

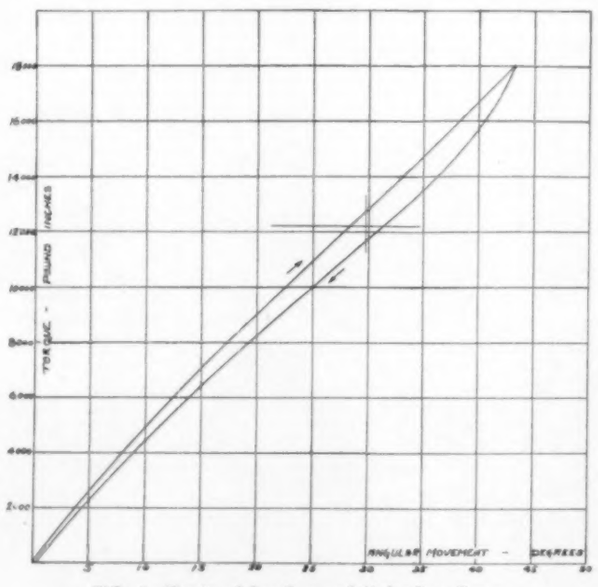


FIG. 4—Torsional Loading and Unloading Curve.

that were well balanced. It is not the intention of this paper to go into the method of arriving at optimum spring deflections; however, rubber springs should be particularly effective on models where good distribution of mass permits the use of relatively low spring rates, both front and rear, without recourse to tight shock absorber control to correct other shortcomings.

It may be assumed that static loaded deflection will be from 7 to 12 inches. From the proposed layout the length of effective arm from the rubber spring to the steering knuckle can be determined, although rubber torsion springs permit somewhat more freedom since there are no coil spring seats, no seat angularity problem, or high leaf spring stresses to limit the designer. In general, the tendency will be toward making the wheel support arms shorter with this type of suspension than has been customary in this country with steel springs. With arm length and static spring load and static deflection determined, the loaded moment and torsional rate of the spring is fixed.

Where the moment and torsional rate of the rubber spring are known, it is possible to proceed with problems of bushing design. A wide range of designs will meet any fixed requirement for static load and rate. That is, the bushing may be long and slender or short and thick, depending on such chassis considerations as clearances and the amount of flexibility desired in the mounting. It is therefore necessary to know something about the characteristics of such a spring before proceeding to more detailed spring design. The Torsilastic spring shown in Fig. 1 is typical of a design for the front suspension of a 3400 lb. car and has the characteristics shown in succeeding figures.

Figure 3 is a torsional loading curve for the spring shown in Fig. 1. The graph is practically a straight line at and near the static load point. The steeper slope at light loads is typical and a somewhat more pronounced stiffening at high angles is found with some designs; however, for all practical purposes it is a constant rate spring throughout the range useful in suspension.

Figure 4 is a torsional loading and unloading curve for the same bushing. The spread between the two lines can be referred to as hysteresis or energy absorbed during the cycle, although it is important to note that this apparent loss is modified considerably

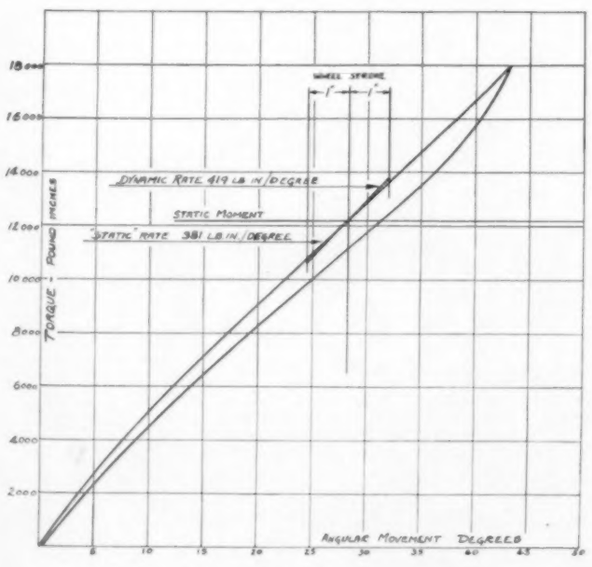


FIG. 5—"Dynamic" vs. "Static" Cycle.

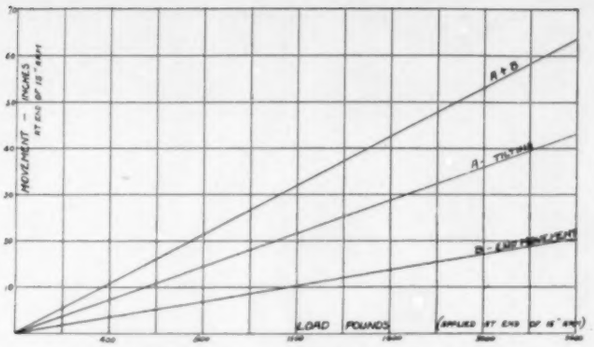


FIG. 6—Deflection under Tilting and Axial Forces.

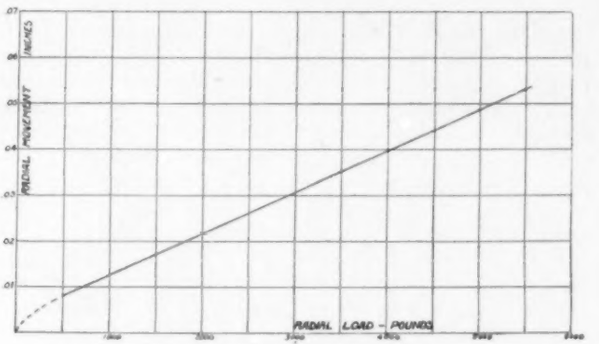


FIG. 7—Radial Deflection.

by the time required for the cycle and to a lesser degree by the Joule effect, which will not be discussed here.

The rate or frequency of the cycle modifies not only the hysteresis loss but also the slope of the stress-strain curve for any rubber spring. Figure 5 is similar to Figure 4 except that a second curve is superimposed to simulate actual service conditions. That is, at a load corresponding to car plus five passengers, the spring is given an angular oscillation equivalent to one inch compression and one inch rebound, making a total of two inch length of stroke of the road wheel. Road tests show that such a movement comes at an average of one every half-mile for normal cross country driving.

This dynamic oscillation test is made in the laboratory by suspending a mass on a moment arm which produces the static loaded torque on the spring. The mass is then excited and the free or resonant period of oscillation observed. The length of laboratory arm need not be exactly the same as the wheel support arm to be used on the car, since we find very little difference in the calculated dynamic torsional rate for the same spring at frequencies from one half cycle per second to two cycles per second. Resonant frequencies are easily converted into dynamic torsional rates by applying the pendulum formula

$$d = \left[\frac{188}{f}\right]^2$$

The deflection "d" is then the nominal length of arc through which the spring turns before it supports the static moment, and unit torsional rate is obtained by dividing the moment by the subtended angle.

Under these conditions the hysteresis loss during the two inch dynamic stroke is so small as to be difficult to show on a graph of this type. The amount of hysteresis depends on the rubber stock used and,

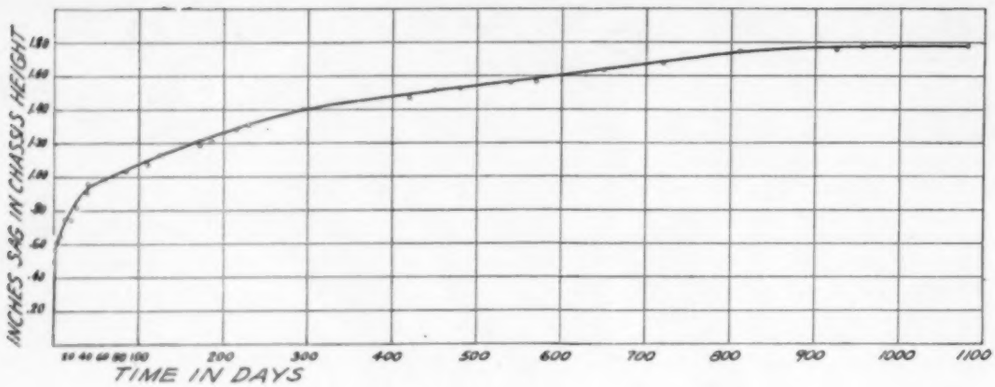


FIG. 8
Creep Test

based on our own experience and much other available research, rubber stocks which show low creep loss may be said in general to show also low hysteresis loss. This curve, while applying directly to Torsilastic springs, is similar to the curves for many other types of rubber springs and indicates the difficulty of dispensing with shock absorbers as is sometimes proposed where rubber springs are used. For large strokes the damping effect of hysteresis becomes noticeable but for short strokes, particularly as in controlling wheel hop, shock absorbers are needed to attain the standard of ride expected by the buying public in this country.

The "static" loading curve shown here for the whole range of spring deflection was obtained by loading weights on a beam to give variable moments on the spring. With this method several seconds elapse between readings and the complete cycle requires two to five minutes. Under these conditions the resultant "static" stress-strain curves will average ten per cent lower slope at normal loaded deflection than the slope of the dynamic curves.

Figure 6 is a graph of the resistance of this same Torsilastic spring to tilting and to axial displacement. This slight elasticity is very advantageous in reducing harshness of ride, and the total amount of any such displacement can be controlled over a considerable range by the proportions selected for the bushing. Figure 7 is a graph of displacement of this same spring under radial forces.

Figure 8 is a graph of the creep or set of a different size of Torsilastic spring in a laboratory test extending three years to date. This spring carries a static shear of 135 lb. per square inch on the O.D. of the shaft, which is approximately 10% higher load than normally used, as described later.

Figure 9 is the creep record for the rubber spring shown in Fig. 1, but taken from actual service records on a test car. It should be noted that these rubber springs have not been adjusted for height or serviced in any way since December, 1936, although the car was somewhat high at that time and is now approximately ½" low, after two and a half years and more than 36,000 elapsed miles, including much very rough handling. Any one of a number of methods can be used to take out the early creep as shown by the nearly vertical rise at the left of the graph. It should be noted that creep is not a straight line function when plotted against static load. That is, a 10% change in static load may cause much more than 10% change in creep over a given time. However, it seems best in most cases to keep the size of the spring down and take a slight amount of creep and provide a simple adjustment which need not be serviced more than once a year under normal conditions.

Life of the Unit

There is one other characteristic of these rubber springs and it is not easily shown in graphical form. That is the life of the unit. In attempting to forecast actual service life of a rubber spring by means of accelerated fatigue tests, it is necessary first to emphasize the extremely wide difference between steel and rubber as elastic materials. Any acceleration in the normal flow of energy through a spring may reasonably be expected to have an exaggerated effect on rubber as compared with steel. This is substantiated by all available test data.

Any required laboratory fatigue life may be obtained with the Torsilastic springs, and accelerated laboratory tests as well as road tests have been used in establishing basic design limitations which will give spring life equivalent to maximum car life without wasting material. The Torsilastic spring shown in Fig. 1 and used for illustrating spring characteristics in other figures is designed in accordance with these limitations, although, as pointed out, a wide range of springs can be designed for any given capacity.

(To Be Continued)

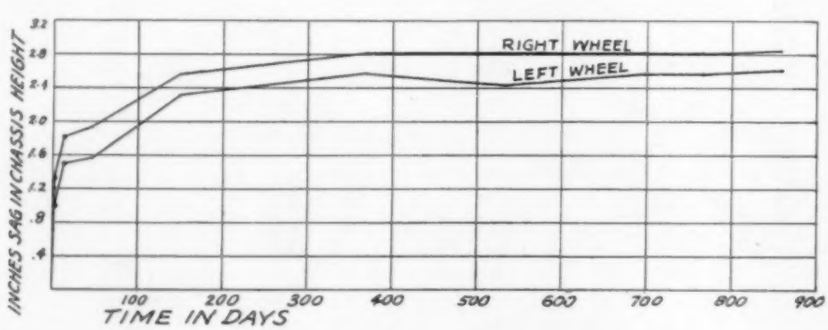


FIG. 9
Creep Record

The rubber industry is well represented at the New York World's Fair. Included among exhibitors maintaining their own buildings are Goodrich, Firestone, Ford and DuPont. Numerous other rubber manufacturers have smaller exhibits in various industrial buildings. In addition, rubber plays an important part in the displays of several non-rubber manufacturers. Because it would not be possible to completely cover the role of rubber at the Fair in one issue, we will devote one article a month to the more important exhibits.

Rubber at the New York World's Fair

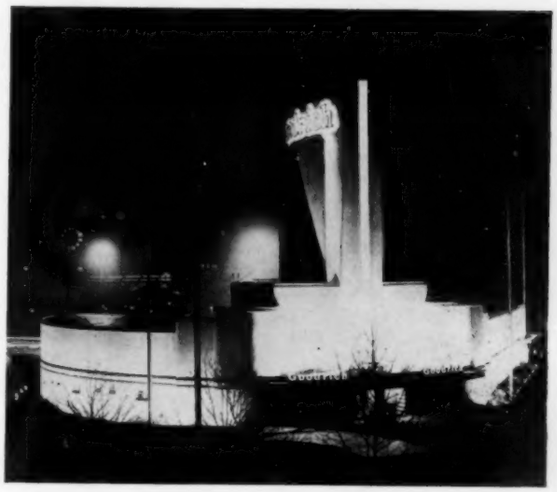
THE GOODRICH EXHIBIT

ONE of the most interesting rubber exhibits at the New York World's Fair is that maintained by the B.F. Goodrich Company of Akron, Ohio. The Goodrich exhibit is really two exhibits in one—the first consisting of an enclosed building in which the public is acquainted with some of the 32,000-odd rubber products made by the company and shown some of the manufacturing processes used to make these products, and the second a huge arena in which daredevil racing drivers show the public how Goodrich tires perform under all kinds of driving conditions.

The Goodrich exhibit occupies a space of 120,150 square feet. It was designed by the late Wilbur Watson of Cleveland and is surmounted by a 90-foot tower at the top of which is blazoned the name "Goodrich." This tower is visible from practically any part of the Fair and is lit up at night so that it stands out prominently as a beacon. It is one of the first sights seen by the visitor approaching the Fair from the southwest. Guy Gundaker is resident manager of the exhibit.

Entering the rotunda of the Goodrich building the visitor stands in a spacious curved room, the floor of which is of multi-colored rubber tile. Directly opposite the entrance, surrounded by safety glass and extending far up into the 90-foot tower mentioned, is a tire guillotine, made by the Adamson Machine Company, which is patterned after the one used in the Goodrich laboratories at Akron. A huge blunt blade keeps crashing down on an inflated tire set between the uprights of the guillotine, sometimes dropping fully 70 feet before reaching the tire. The lay public is invariably entranced with this convincing demonstration.

One of Jimmy Lynch's "thrill" drivers taking the ramp on two wheels while Jo-Jo, the clown, calmly reads his paper.



View of the Goodrich Building at the New York World's Fair showing the excellent lighting effects.

Behind the tire guillotine is a 12 x 24 foot mural which depicts the universal uses of rubber. At either end of the mural stand exhibits of the diversified line of Goodrich farm, farm implement and truck tires. These are in turn backed by a farm mural and a large industrial painting. Turning right, after entering the rotunda, the visitor moves down an aisle which is lined on the right with manufacturing exhibits segregated into panel-like enclosures and on the left with some of the testing units employed by the company in its various laboratories.

The first exhibit displays publicly for the first time some of the methods of the closely-guarded Anode process by which Goodrich manufactures its gloves. As the spectator watches the proceedings, a specially-designed rotating rack, on which are mounted porcelain forms, made by the Colonial Insulator Company, is dipped again and again into a dipping tank, especially made by Goodrich for use at the Fair, until the proper layers are built up. The gloves are then dried and cured and finally given a stretching and inflation test in which they are sometimes pulled to a length of 8 feet and blown up into balloons 4 feet in diameter.

Moving down the line on the right side of the building, the visitor is next shown the method of manufacturing miniature tire ash trays. The rubber is compounded on a laboratory size mill, a product of the National Rubber Machinery Company, and molded in a small platen press made by the Hydraulic Press Mfg. Company. After being removed from the press, the ash trays are inspected and the familiar Goodrich "red diamond" trade-mark is painted on. These ash trays, as well as souvenir packages of Anode gloves, are sold at the exhibit.

Koroseal Displayed to Advantage

The bridge to the newest phase of the modern rubber industry—the search for synthetic rubber—is the subject of the next exhibit. Devoted to Koroseal, Goodrich's polyvinyl alcohol product, this exhibit is set off by long sheets of variously colored Koroseal material arranged as drapes. Lettered panels explain how the product is manufactured and indicate some of its multitudinous uses. A No. ½ Royle tubing machine, made by John Royle & Sons, is used on the platform for making Koroseal tubing. Strips of this tubing, of narrow diameter, are made into vari-colored flowers which are also sold as souvenirs.

The final exhibit along this row is devoted to the building of canvas and rubber footwear. Although no actual manufacturing is done, a rotating display board traces the steps in the manufacture of canvas footwear as practiced in the Hood Rubber Company plant at Watertown, Mass. There is also an animated demonstration of the new foot posture base used in shaping these shoes. Cross-sections of shoes enable the visitor to visualize each of the manufacturing steps disclosed on the display. A photo-montage next to the rotating display board indicates the many sports in which the company's footwear is used.

At the far end of the aisle an exhibit stresses developments pioneered by Goodrich in the aeronautical field. A large diorama features the De-Icer. Against a cloud background, with other clouds rising upward and two projectors creating an impression of snow, a 12-foot plane model, its propellor whirring, appears to be winging its way through the night. The plane is equipped with De-Icers which are constantly pulsating.

To the right of this diorama the airplane brake recently developed by Goodrich is on display. The lining of this brake is evenly forced against the drum by expanding a rubber tube. The flexibility of the tube equalizes the pressure against the entire surface of the brake drum even when the drum is out of round. By pressing a button, the visitor can convince himself of the quick stopping action inherent in this new brake.

Swinging back on the other side of the aisle one first sees an exhibit devoted to Goodrich's Flexlock rods, pipes and joints. A wide variety of sizes and styles of this material, which finds wide application in the general industrial and chemical fields, are on display. Flexlock joints are used to join rigid pipe so that the pipe line is flexible.

Next in line is an exhibit demonstrating a section of the newly-perfected subway and trolley car truck. Cut-away sections show how rubber is now being used in the transit industry as "sandwiches" in wheels and as springs to deaden noise and to increase riding comfort. Through the use of a motor-driven lever, visitors can set the display into motion, actuating the rubber spring. This entire exhibit is placed in a setting of photo-murals which show the new subway trains now undergoing experimental runs on the Brooklyn-Manhattan Transit System in New York City which are equipped with these rubber "sandwiches."

The next unit is one of the more spectacular of the entire exhibit. An automobile weighing 4,800 pounds is lifted off the floor by a slender piece of rubber 4 inches wide and 12 inches long. Attached to two metal plates by the Vulcalock method, the rubber strip raises the car off the platform and lowers it again upon pressure exerted on a push button. Other uses of the Vulcalock process are indicated by photo-murals showing rubber-lined tank cars and the use of rubber on large industrial equipment.

The last unit is a battery exhibit which shows the stamina of the modern Goodrich storage battery. On a large board are mounted all the various automobile accessories operated by the battery, including dome light, dash light, headlights, defroster fan, heater, radio, starter switch, etc. Cables run from each accessory directly to a single battery mounted on a glass pedestal. As each unit goes into operation a glass sign is illuminated and shows the amount of electricity consumed. Cut-away sections of batteries showing spun glass battery mats are included in this exhibit as are also various other accessories.

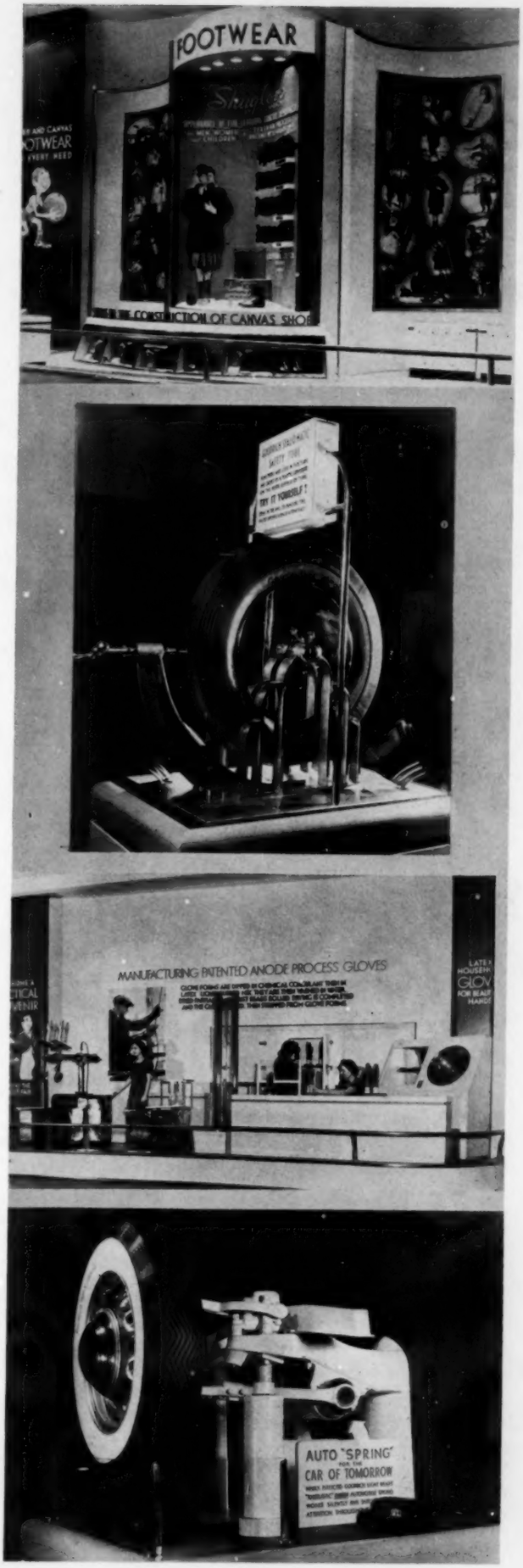
To the left of the entrance of the Goodrich building there are a number of other interesting exhibits. One of the chief of these is a skeleton automobile chassis on which are mounted more than 250 rubber parts. Another is a large map of the world showing the geographical source of supply for many of the ingredients used in the manufacture of miscellaneous rubber products. Bales of crude rubber and cotton used for tire cords round out this exhibit. There are also several large window-like displays in which are exhibited some of the thousands of rubber products made by Goodrich, including drug sundries, toys, footwear, etc.

In addition to the exhibits lining the aisles to the right and left of the entrance to the building, there are also several aisle displays worthy of mention. These special displays are devoted to the Goodrich "vibro-insulator," the processed rubber mountings for silencing machines; a contracting and expanding section of a highway equipped with rubber joint fillers; the "Seal-O-Matic" puncture-proof tube, which is mounted on a device enabling visitors to drive a nail directly into the tube; and a demonstration of the recently developed "Torsilastic" rubber automobile spring. Consisting of rubber bonded to metal shells, the rubber spring demonstration gives the lay public its first glimpse at an invention which combines the resiliency of rubber with the strength of steel to increase motoring comfort.

Description of the Huge Arena

Outside the building is the arena. The entrance to the arena is located at the far end at the right of the building itself. It resembles a football gridiron in size and shape. At one end of the arena is a huge covered grandstand which can seat approximately 5,000 in comfort. At the end furthest from the grandstand there is a bank turn. In this arena Jimmy Lynch, noted Texas auto daredevil, and his equally noted troupe, present "thrill driving" and "death dodging" stunts six times daily.

Six times every day Jimmy Lynch and his troupe make cars leap through the air, jump tracks, careen off the bank turn, and go into sensational single and double spins and reverses. On sections of the circular track wetted down by sprinklers, visitors take part in unique "skid seminars" in stock cars equipped with Goodrich Silvertown tires. The auto rodeo, as it is termed, is designed to prove to the public how safe Goodrich tires are, and also stresses the part played by the driver in the safe operation of automobiles.



Behavior of Rubber Hydrocarbon

THE special type of apparatus used in vacuum distillation, which has received the name of molecular still, has some unique features. The distance between the distilling and condensing surfaces is less than the mean free path of the molecules. Molecules proceed in a straight path to the condenser, and no recondensation takes place on the distillation surface. These surfaces must be close to one another to facilitate condensation and to minimize collisions.

In the course of some work recently in the laboratories of the National Bureau of Standards at Washington, D. C., W. Harold Smith and Henry J. Wing attempted the distillation of rubber with this type of still. The tendency for distillation to take place decreases with increasing molecular weight. Consequently, it seemed possible that molecules in rubber might be distilled if small and if the vapor pressure of the rubber could be increased sufficiently so that molecules would leave its surface.

Three experiments were conducted to distill rubber in this manner at 160° C. for varying periods, and with the condensing surface at different temperatures. These experiments, which are fully discussed in the May, 1939, issue of the *Journal of Research*, published by the Bureau, are briefly reviewed herewith:

In one experiment, which was conducted for about 100 hours, the condensing surface was chilled by liquid air. A thin, transparent deposit, consisting of about 2 mg., appeared on the condensing surface. It was feebly extensible and did not recover completely when deformed. Its physical properties more nearly resembled rubber than those of other distillates. In a second experiment lasting 250 hours, solid carbon dioxide and acetone were used in the condenser; and in a third one, which was continuous during 140 days, the condensing medium was tap water at about 10° C.

It was difficult to remove oxygen from the specimens of rubber which were used. Consequently, the distillates in these experiments may have been oxidized, at least in part. The distillation products were hard, transparent, and insoluble in ordinary solvents of rubber. In the third experiment the distillate amounted to about 20 mg. and showed an iodine number of 328 as compared with 370 for the original purified rubber, indicating that oxidation or cyclization or both may have taken place.

Non-Staining Thermax

IMPROVEMENTS in the process of manufacture have greatly reduced the content of oily or tarry substances in Thermax, the soft carbon marketed by the R. T. Vanderbilt Company, of New York. Since these substances are the cause of discoloration and bleeding and since the amount of benzol-extractable material in the carbon is now almost negligible, Thermax as produced today is practically completely non-staining and non-bleeding.

The improved Thermax is now suitable for use as a loading material for gasoline-resisting articles of rubber, neoprene or "Thiokol", where formerly it might have been excluded on the score of discoloration, according to Vanderbilt. It is also suitable for use in stocks for white sidewall tires as well as for all-black tires because of its practical freedom from bleeding through a white stock. Together with a little carbon black for deeper color, if desired, it makes a good loading ingredient for black footwear compounds.

Neoprene Latex Type 57

AN alkaline aqueous dispersion of neoprene, said to have good mechanical and chemical stability, has been introduced by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, under the name of Neoprene Latex Type 57. The neoprene particles in the new dispersion are negatively charged and are uniformly of about 0.1 micron diameter; they have a vigorous Brownian movement and consequently the latex does not cream.

Neoprene Latex Type 57 contains 50% solids, has a specific gravity of about 1.10 at 25° C, a pH of about 10 which decreases slightly, and a specific conductivity of approximately 0.005 which increases slightly with age. The variation in these last two values is said to be due to the slow formation of hydrochloric acid from the neoprene of the latex and to the consequent increase in amount of salts.

The new type of neoprene latex is "thinner" than rubber latex at the same concentration. It may be thickened with gums, starches, gelatin, casein and with other materials. The neoprene in the latex may be coagulated by organic liquids, such as alcohol or acetone, as well as by salts, acids and by drying or by filtering and drying. It may be made to gel with boric acid or sodium fluosilicate. The neoprene latex may be mixed with natural rubber latex without any special precautions.

The properties of films made from combinations of the new neoprene latex with rubber latex usually lie between those of the films of the constituent latex compounds though the tensile strength may be less than that of films from either the rubber or the neoprene latex compounds alone. Aqueous dispersions of substances whose particles are negatively charged may in general be mixed with the new neoprene latex without coagulation while dispersions containing positively charged particles cause coagulation.

"Ruglyde" Rubber Lubricant

UNDER the name of "Ruglyde," a new penetrating rubber lubricant for use on rubber parts in automobiles, as well as other applications, has been introduced by the American Grease Stick Co., Muskegon, Mich. The new lubricant contains "dag" colloidal graphite blended with a pressure saponified Babasu oil, inhibited with glycerol compounds, so as to provide a permanent wetting property and make it unaffected by atmospheric temperatures.

According to its manufacturer, "Ruglyde" will not harm lacquer, varnish or any other type of finish, nor corrode metals. Tests have indicated that it will not cause deterioration of any type of rubber, including latex sponge rubber. It is non-inflammable and non-poisonous. Due to its low surface tension and low viscosity, it penetrates the closest fitted rubber parts. It will not dry up even in the warmest climates, and will withstand, without freezing, temperatures below zero.

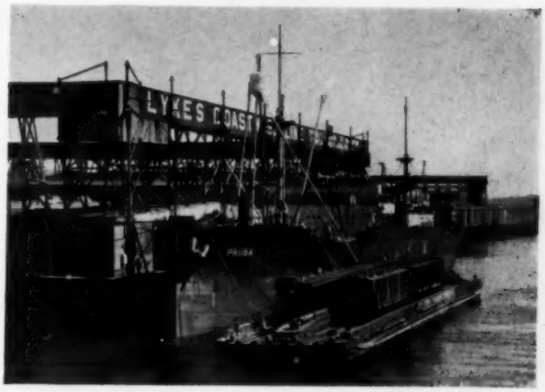
Not only does this new material serve as a lubricant, according to the manufacturer, but because it contains no materials which cause disintegration of rubber it also acts as a rubber preservative.

Work on the 1939 RUBBER RED BOOK is proceeding rapidly. Publication is expected to be made about July 31.

Bulk Carbon Black Transported by Water

Experimental Coastwise Shipment by Cabot Indicates That Big Economies Are in the Offing for Consumers

ON May 9 the *S. S. Prusa* of the Lykes Coastwise Lines, which had sailed from Corpus Christi, Texas, on April 30, arrived at Boston, Mass., with a 150,000-pound cargo of carbon black in her forward hold. Arrival of the ship marked the first bulk shipment of carbon black ever made by water. Representatives and officials of several large rubber companies, as well as carbon black producers, were on hand to witness the unloading of the cargo, while officials of deep water steamship companies also observed the proceedings with a weather eye open to new shipping trade. To the technicians and engineers of Godfrey L. Cabot, Inc., carbon black producers of Boston, Mass., goes the credit for developing the unique method of successfully loading and unloading which made possible the transporting of carbon black in a cargo vessel.



General view of the discharge of carbon black from the hold of the S.S. Prusa after the boat docked at Boston.

No Dust or Stain in Evidence

When the hatch cover was lifted, and at various stages of the unloading, general amazement was expressed by witnesses that no carbon black dust or stain was in evidence. The fact that the operation demonstrated that carbon black can actually be shipped loose in a ship's hold—more cleanly than in paper bags—makes this accomplishment of outstanding interest to the rubber industry in general and the export business in particular.

The expense of packaging and shipping carbon black has been a major problem and annoyance to both black manufacturers and consumers since the inception of the industry sixty odd years ago. When carbon black was first made, it was packed in barrels in a condition so light, fluffy and flocculent that only 40 pounds could be squeezed into a barrel. A series of mechanical developments, including barrel packers and agitators, eventually permitted 80 pounds to the barrel, and made packaging in paper bags also possible; but barrels were widely used as a package, particularly in the export trade, up to 1910 and later. Subsequently, the barrels were replaced by heavy wooden cases.

The use of carbon black by the rubber industry, beginning about 1915, very swiftly brought increased attention to the dustiness of loose, flocculent carbon black when handled, and resulted, first in consumers' works and soon afterwards at producers' factories, in the development of various methods for compressing or briquetting paper packages. In spite of the additional package strength obtained by briquetting, however, all water-borne shipments, both coastwise and export, were made in wooden cases until 1925 and later.

Still striving to reduce packaging and shipping costs, the carbon black industry in the last ten years developed paper packages to a sufficient strength so that, given careful handling and storing, they can be transported in ships without a serious degree of breakage. But the small amount of breakage which inevitably occurs in the movement of any large number of paper wrapped packages by water is a constant source of expense and annoyance both to steamship operators and consignees.

The development of pellet forms of carbon black, and bulk shipments of this type of black to domestic markets in special dust-tight tank cars, has already eliminated carbon black dirt and handling expense in the plants of those domestic consumers equipped to receive such shipments in bulk. Coastwise shipments of bulk black in such tank cars have been made by the Seatrain, but the inflexibility and incidental extra expenses of that method of transportation have been and remain serious drawbacks.

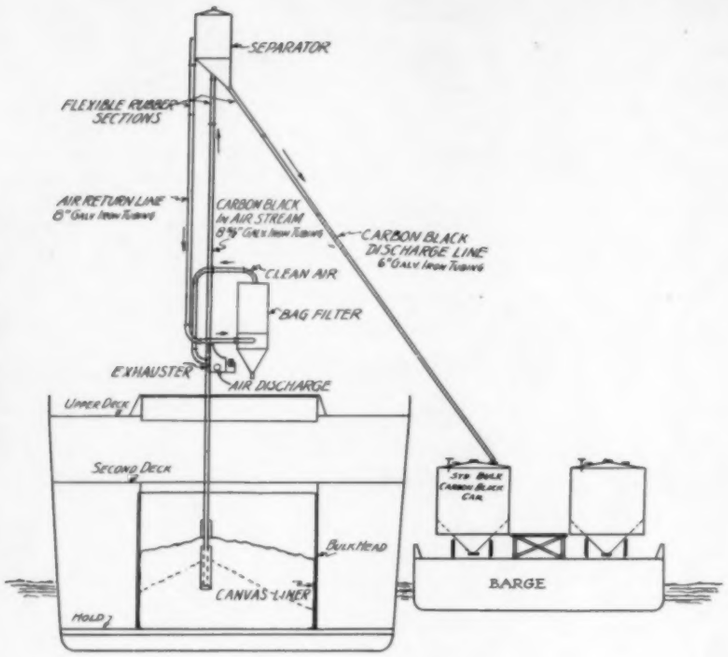
It seems obvious from all of the above that if carbon black could be loaded and unloaded from a ship's hold in bulk in as rapid and cleanly a manner as it moves in and out of domestic railroad tank cars, a very great service would be rendered both to steamship operators and to consignees, and very material economies might reasonably be expected. The experimental shipment on the *S. S. Prusa* was made solely to determine whether a substantial commercial bulk cargo of Cabot "Spheron" could be handled to the satisfaction of both steamship operators and interested consumers.

Objectives of the Experiment

The direct objectives of the experiment were threefold: (1) To accomplish efficient, dustless transfer of the bulk black from tank car to hold of steamer; (2) To determine whether it was possible to stow bulk black so that there would be no leakage, no shifting of

RIGHT: Diagram outlining the method of transfering bulk carbon black from ship to car as devised by engineers of Godfrey L. Cabot, Inc.

BELOW: Suction nozzle about to enter the big dust-tight canvas hold liner at the start of operations for discharging the carbon black.



the black in the hold during transit, and no contamination either of other cargo by the black or of the black by other cargo; (3) To accomplish efficient, dustless transfer of the black from cargo hold to tank car.

After more than two years of investigation, design and redesign, Cabot developed and constructed small-scale, portable equipment for the transfer of the carbon black to and from the cargo hold. This equipment operates on the principle of a vacuum cleaner, and makes use of a specially-constructed suction nozzle, a centrifugal separator and a standard dust removing machine. In loading at Corpus Christi, the black ran from the tank cars into a large hopper, whence it was drawn up to the separator by a rapid but gentle stream of air. In the separator the air was removed from the black and was returned to the dust remover, cleaned, and discharged. The black flowed by gravity from the separator into the hold of the ship.

A wooden bulkhead was erected in the hold of the vessel in order that the cargo of black could be inspected both from outside and from the top, during transit and on arrival. It was covered with building paper so that the slightest leakage of the black, or any tendency to chafe, could be detected after unloading. A large dust-tight canvas hold liner filled this bulkhead, and into it the carbon black poured through a small, funnel-shaped opening. The full load of black was topped off in a conical heap, the opening in the bag was sealed tightly, and the shipment was ready for sea. The portable apparatus was loaded aboard and brought to Boston, to be used there in unloading.

After a 2,000-mile voyage from Corpus Christi to Boston, it was found that the cone-shaped top of the load of black had not shifted in any appreciable degree during the normal motion of the ship at sea, thereby demonstrating that bulk carbon black makes a distinctly stable cargo. There was complete absence of any trace of black dust, either outside or inside the wooden bulkhead or on top of the hold liner itself; and although the operation was under constant critical supervision there was apparently no possibility of contamination of the carbon black by foreign substances.

The unloading process was the exact reverse of the loading procedure, except that the tank cars were moored on a barge alongside the steamer, thus eliminating the need of adjustments for tide. The portable dust remover and air exhauster were re-erected over the cargo hatch; the centrifugal separator was slung above the hold at the end of the jumbo boom; and the delivery pipe led over the vessel's side to the tank cars. As the amount of black in the ship's hold diminished, the sides of the canvas hold liner were drawn up so that the black flowed toward the center, where the suction nozzle was suspended.

A long list of operating and manipulating difficulties could be mentioned as inevitable incidentals to an experiment so novel and unusual. But in the last analysis, and despite mishaps, the fact remains that no black got loose and no foreign matter of any kind got into the black.

If the engineering and operating problems disclosed by this experiment can be solved as successfully as its primary objectives of cleanliness and freedom from contamination have been met, then many of the obstacles now in the way of bulk marine shipments of carbon black may eventually be overcome.

Intramine Y—Rubber Lubricant

AMONG the materials used to lubricate rubber surfaces to prevent adhesion of uncured stocks is Intramine Y, a product of Synthetic Chemicals, Inc., 57 Wilkinson Avenue, Jersey City, N. J.

Intramine Y can be added in small amounts (½ to 1%) to cocoanut oil soap solutions and it is claimed that it thus increases the lasting properties of the solution and gives an increased lubricating efficiency to the soap solution. In press work, the uncured stock is sprayed with the lubricating solution to prevent adhesion of the vulcanized article to the mold.

Other uses recommended by the manufacturer for Intramine Y include its use in drying compounds to prevent formation of air bubbles in finished rubber products; in extruded work to prevent formation of grease on the surface of the soap bath and to help in overcoming collapsing of tubing; and in preventing adhesion of uncured milled rubber by spraying the stock with soap solutions containing Intramine Y before piling for storage.

Crude Rubber Situation

International Rubber Regulation Committee Seems to Be Repeating Mistakes Made Earlier in Scheme

By E. G. Holt

Chief, Leather and Rubber Division,
Bureau of Foreign and Domestic Commerce

MANY rubber manufacturers are becoming increasingly concerned over the declining trend of available crude rubber stocks. Mr. Holt made this subject the topic of an address before the Akron Export Club in Akron, Ohio, on May 26th, later incorporating the more pertinent of his remarks in the May 31st issue of the "Rubber News Letter." Because of the importance of the topic, we are reproducing Mr. Holt's remarks in full herewith.—Editor.

THE decision for 55 per cent permissible exports of crude rubber during the third quarter (of the current year), accompanied by a somewhat shorter than usual interval before the next meeting of the International Rubber Regulation Committee, looks toward a further reduction in stocks which are already becoming too low for general stability except under the abnormal international political uncertainties of recent times. In many respects the situation parallels that during late 1936. There are important factors, however, which differ.

Existing Situation Uncomfortable

There are the same low, and declining, and poorly distributed stocks; the same hesitant, gradual releases of increased production, too slow to anticipate any situation which might arise; the same sidewise movement of prices, or delayed price reaction to lowering stocks; the evidences of characteristic buyer-seller attitudes in a situation where for the period for which releases have already been announced, higher prices would not affect the shipments.

Then, too, consumption in 1939 will likewise exceed 1938, slightly less perhaps than 1936 exceeded 1935; United Kingdom stocks are being drawn upon again somewhat from the United States; the price range between various grades of plantation rubber has narrowed; producers intermittently express dissatisfaction with the price level which has obtained so long, and now argue not only that it costs more to produce under conditions of severe restriction, but also that the current costs of new and re-planting are a factor warranting higher prices. The same time elements between shipments and arrivals in consuming markets are factors of importance.

The significant differences from the late 1936 situation include a better general awareness of the situation which *may* have affected trading practices—estates *may* have sold forward and manufacturers *may* have covered ahead for a longer period, and at any rate the certainty of capacity for production in case of sharply increased permissible exports is realized. There are now some excess stocks on estates behind the restriction barrier which could be quickly released, but their volume is not very great, and definite provision for their release and actual shipment is needed.

A barter proposal (cotton for rubber) adds to market uncertainties and has doubtless acted as a deterrent to speculators, since its possibilities lie in the unpredictable field of international politics. Sterling has been lower relative to dollars than in 1936.

Germany doubtless has a considerably larger domestic stock of crude rubber now than in 1936, as a result of heavy imports and embargoed exports of scrap rubber, and growing production and use of synthetic and reclaim. Japan is reducing rubber imports to minimum requirements (1939—35,000 tons, 1938—46,000 tons, preceding average over 55,000 tons). Scrap rubber is being made use of to an increasing extent, after reclaiming, in these countries and Italy. Synthetic rubber is also gathering headway.

In the United States, discovery in early May, 1939, that 1938 rubber consumption was over 27,000 tons higher than had previously been calculated, left the market unaffected for the moment. In 1936, the shipments from producing countries were in general below permissible exports, but now they are well ahead of permissible exports, and if the position were to be corrected in any single quarter it would reduce allowable exports near 5 per cent. Replacement tire sales in the United States are thus far holding at a level higher than had been anticipated for 1939, perhaps because tire retreading is now growing less rapidly.

In summation, it is certain that at some point stocks can become so low that the market would not remain orderly. To prevent this, it is increasingly probable that an enlargement in allowable exports to the extent of maybe even 15 or 20 per cent at a particular time may again become necessary in this quick-changing industry. The last two decisions have been probably 5 per cent each lower than would have been desirable for normal safety, but disturbed international relations, barter discussions, domestic business uncertainties, etc., have prevented normal reactions.

Regulation Committee Faces Test

The situation appears to be moving inevitably to a point which will again test the capacity and intentions of the International Committee. It seems unlikely that they would risk further stimulation to synthetic rubber and increased use of other substitutes, which once adopted remain in use for a long time to the detriment of the long-term interests of rubber producers. But the apparent pursuance of fixed price objectives above the level which has been in effect for so many months leaves their aims somewhat in doubt. Without restriction, the price of rubber would be no more than half its current level.

What may for months have been a real scarcity of stocks only reflects itself unduly in the price structure when it becomes certain that the scarcity cannot be rectified within a period sufficient for a sharp market movement. And this industry has an unfortunate record of using larger than expected quantities of rubber just when supplies have been seriously shortened by production control.

Charles Goodyear

CONNECTICUT YANKEE AND RUBBER PIONEER

By P. W. Barker

CHAPTER XV

Death of Charles Goodyear

AFTER spending almost six full years in Europe, Charles Goodyear returned to the United States in May, 1858, broken in health and purse. His affairs would have been in much better circumstances had he remained at home. His European trip was as near a complete failure as he could have experienced; patent rights lost and death in his immediate family. Only the patient care exercised by the second Mrs. Goodyear, and his indomitable spirit, saved him from death in England.

Goodyear's Receipts from Patent

Immediately after returning to the land of his birth, Goodyear went into a series of conferences with his attorneys. Unless extension was granted, the vulcanization patent would expire on June 15, 1858. The inventor's receipts from the patent, according to his sworn statement, amounted to $162,894.09. Expenditures allowed by the auditor of the Patent Office were $108,160.46. Thus, Goodyear theoretically earned $54,733.63 for eighteen years of labor, or $3,040.70 a year.

Goodyear would indeed have been fortunate were he able to show anywhere near this amount of cash in the bank. One item in his report to the Patent Office, amounting to $13,310, covering expenses accrued prior to the discovery of vulcanization, was disallowed by the auditor, but it reduced the cash account of the inventor. Furthermore, Goodyear had not yet paid his brother-in-law, William C. De Forest, the $46,084.46 which was owed on notes. He also admitted other debts which were not directly chargeable to the patent, and it was quite evident at the time that he was indebted for a considerable sum, the exact amount of which even he was unaware. In any event, extension was granted.

In granting the extension for seven years to June 15, 1865, Commissioner of Patents Joseph Holt was heartily in accord with the wishes of Goodyear as expressed in his petition, making several pointed remarks about Horace H. Day and Charles F. Stansbury, representative of Macintosh & Company. A few choice selections from the Commissioner's decision follow:

"In one of those animated conversations so habitual to him, in reference to his experiments, a piece of India-rubber combined with sulphur, which he held in his hand as the text of all his discourses, was by a violent gesture thrown into a burning stove near which he was standing. . . . The thorough self-culture and training of the applicant and his unwearied researches prepared him at once to seize upon, to comprehend and embody in a practical form, the truth he sought, no matter, how dimly, to him. . . . Has the inventor been remunerated? . . . .

"It is extremely difficult to estimate in the coin of dollars and cents the worth of eighteen years of the prime of human life—especially so, when that life is one of lofty genius, of indomitable enterprise, and of stainless virtues. . . . He is now seen tottering toward that grave which must soon open in his path. . . . No inventor probably has ever been so harassed, so trampled upon, so plundered by that sordid and licentious class of infringers known as 'pirates'. . . . In the very front rank of this predatory band stands one who sustains in this case the double and most convenient character of contestant and witness. . . .

Termed "Public-Spirited Inventor"

"At the close of all his toils and sacrifices, and of the humiliations he has been called on to endure, this public-spirited inventor, whose life has been worn away in advancing the best interests of mankind, is found to be still poor, oppressed with debt, and with the winter of age creeping upon his shattered constitution. . . . He now begs that he may be allowed to enjoy for a few years longer that precarious protection which our most feeble and imperfect laws extend; and, were the appeal denied, I feel that I should be false to the generous spirit of the patent laws. . . . The patent will, therefore, be extended for seven years from the 15th June, 1858."

In the winter of 1859, Goodyear purchased a home

NOTE: This biography of Goodyear started in our April, 1938, issue.

at 253 I Street North, in Washington, D. C., the present address of which would be I Street, between 17th and 18th Streets, Northwest, approximately four squares (or blocks) northwest of the White House. His unmarried children, Clara, 18, and William Henry, 12, lived with him. A more-or-less complete laboratory and a large experimental tank or tub were installed, and the inventor planned experimenting with life preservers and other life-saving devices. Life preservers had been the original stimulus to his experiments with rubber, and it is most fitting that they occupied his last days.

Charles Goodyear was a very sick man when he moved to Washington. He was in his 59th year and had not enjoyed a really well day since his physical breakdown some 38 years before. Prodigious labor had been performed by a small and sickly body driven relentlessly by an extraordinarily active mind. Contemporary physicians diagnosed his ailment as gout: Had not his joints become swollen and painful? At this point of his life Goodyear is described as, "A small attenuated, sickly man, with a weak stomach, faltering limbs, and feeble almost as a puny child."

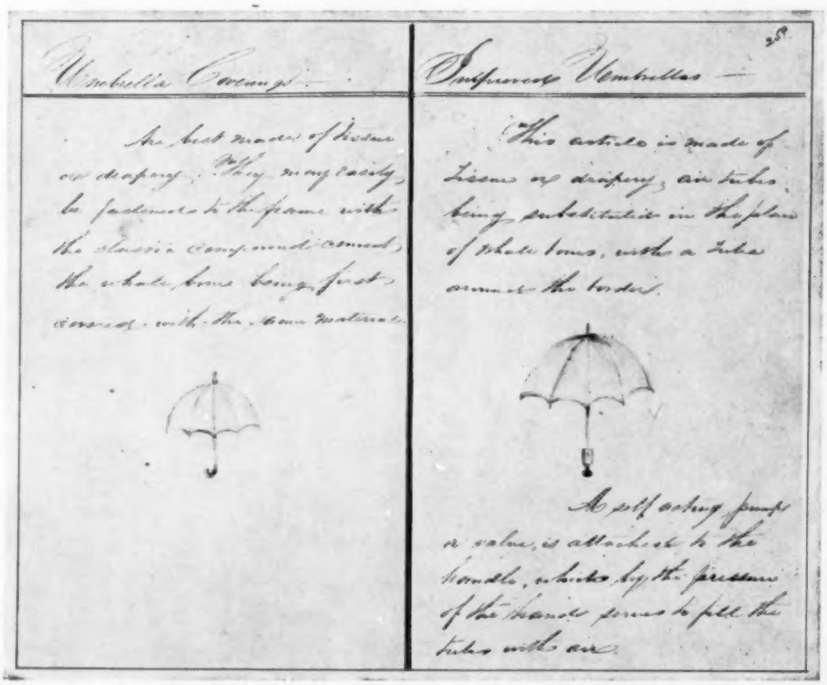
Charles Goodyear was dying, but not from gout. His was to be another scientific death. The thing he had made would kill him. A clue may be found in *Gum-Elastic*, page 72, volume 1: "Fingers were the only mechanical power of which the writer had command during the first two years of his experiments, and that by which he mixed and worked many hundred pounds of gum, afterwards spreading it upon a marble slab with a rolling-pin." It will be recalled that Goodyear considered white lead as one of the necessary ingredients in his "triple compound," of which sulfur and rubber were the most important.

The Encyclopedia Britannica defines gout thus: "The name rather vaguely given, in medicine, to a constitutional disorder which manifests itself by inflammation of the joints, with sometimes deposition of urates of soda, and also by morbid changes in various important organs. It may also affect persons who observe the strictest temperance in living, and whose only excesses are in the direction of overwork, either physical or mental. Persons exposed to the influence of lead-poisoning, such as plumbers, painters, etc., are likely to suffer from gout; and it would seem that impregnation of the system with this metal markedly interferes with the uric acid excreting function of the kidneys." It is apparent, therefore, that Charles Goodyear was shortening his life with every experiment he made with rubber, lead and sulfur. He had been dying for years from lead-poisoning.

The few weeks of peace in Washington enjoyed by Goodyear early in 1860, during which his experiments gave him considerable satisfaction, were soon to be disrupted. How short were such intervals in the good man's life!—a life rapidly approaching its end. On May 30, the inventor received word that his daughter Cynthia, aged 32, who had married a cousin, George Goodyear, was dangerously ill in New Haven. Always the devoted parent, he wanted to see her, and sick as he was himself he prepared for the arduous journey.

Travel by railroad was considered too strenuous for his precarious health, and Goodyear started the first leg of the journey on the Steamer *Montebello*. In addition to his other troubles, the aging inventor suffered seriously from seasickness on the trip and reached New York in miserable shape. George Goodyear met him on the dock with the news that Cynthia had died on May 31st.

Much too ill to attend the funeral of his daughter in New Haven, the bereaved father was carried to quarters in the Fifth Avenue Hotel, on West 23rd Street and Broadway. Although Mrs. Goodyear was promptly advised of his condition, she was unable immediately to go to New York; her third child, Fanny, had been born on April 25th. By June 7th, however, she was at the bedside of her husband in the Fifth Avenue Hotel, and although she knew he was very sick, she was unprepared to find his condition so hopeless. He recognized her, but was unable to do more than mumble a few words from the time of her arrival until the day he died. On two occasions, all the members of his family were present in his room for prayers and to receive his parting blessing. His suffering was acute, but he bore it with his life-long courage.


Umbrellas Covering —
The best modes of these are drapery. They may easily be fastened to the frame with the elastic compound around the whole, some long first covered with the same material.
Improved Umbrellas —
This article is made of linen or drapery, air tubes being substituted in the place of whalebones, with a tube around the border.
A self acting pump or valve, is attached to the handle, which by the pressure of the hand serves to fill the tubes with air.

Goodyear's inventive mind is excellently indicated by the drawings of umbrellas shown in this reproduction of two facing pages from the manuscript notebook used by the inventor in preparing his "Gum-Elastic" for publication.

As the church bells called the faithful to early worship on Sunday, July 1, 1860, the poor, suffering spirit answered the call of his Maker to that peace which is eternal and which had been denied him on earth. Charles Goodyear, Connecticut Yankee and Rubber Pioneer, the discoverer of vulcanization, was dead.

Obituaries in "Times" and "Tribune"

The *New York Times* of July 2, 1860, carried the following obituary notice: "GOODYEAR—In this City, on Sunday, July 1, at the Fifth-av. hotel, of gout, Charles Goodyear, aged 59 years. The friends of the deceased are invited to be present, without further notice, at his funeral, which will take place, at the residence of his son, Charles Goodyear, Jr., New Haven, Conn., on July 3, at 2 o'clock."

Horace Greeley's *Tribune*, issue of July 2, 1860, gave Goodyear an excellent obituary: "He felt th burden of honorable obligations which his patents imposed upon him, and, with complete disinterestedness, kept himself poor that he might enrich the world at the earliest possible moment with the greatest number and variety of completed practical applications of the material to man's uses. Some of the most important uses and applications of vulcanized India-rubber were perfected by Mr. Goodyear only recently. He has thus been taken away in the midst of his useful labors."

On July 8th, one week after Goodyear's death, the Rev. S. W. S. Dutton preached a commemorative sermon in North Church, New Haven, on the life and works of the inventor. It must have taken about two full hours to deliver this sermon, which may be read in *The New Englander* of August, 1860. Among those in attendance were Professor Benjamin Silliman, who had assisted Goodyear with scientific information, and William C. De Forest, the brother-in-law who had so often loaned him money to further his experiments.

An insight to the legacy left by Charles Goodyear is found in the unsuccessful petition made by Charles Goodyear, Jr., in 1864 to the Congress of the United States for a further extension of the vulcanization patent. Referring to his father's circumstances at the time of death, the younger Goodyear made this statement: "He left a widow, who is in feeble health; five children, the youngest now only four years of age; one grandchild, the daughter of a deceased daughter; and one adopted child, who are nearly all, if not all, wholly dependent upon the settlement of his estate for their pecuniary maintenance and support."

Charles Goodyear's True Legacy

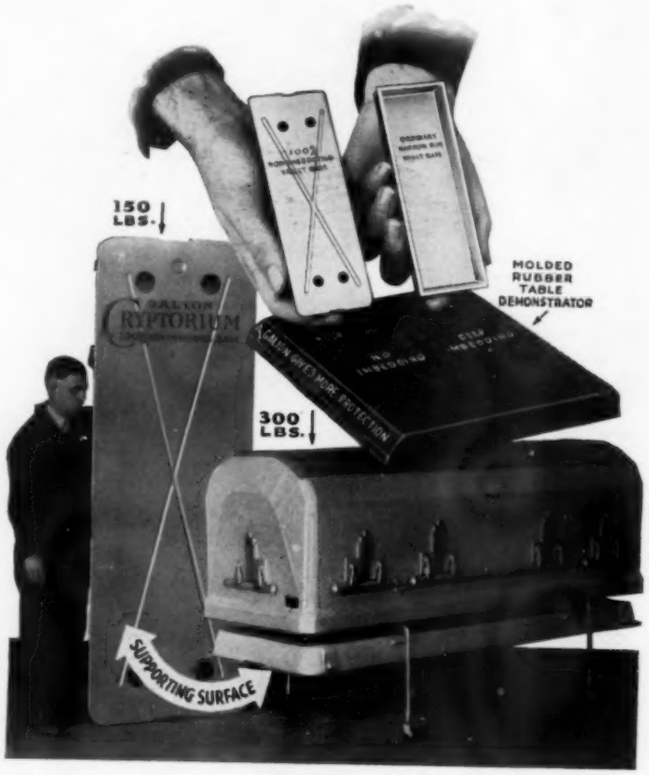
Regarding the father's debts, the son said: "During the lifetime of Mr. Goodyear, his heavy liabilities were kept in suspense by partial payments and by renewals; so that he himself did not know with accuracy their amount; but since his death, and in the course of the settlement of his estate, it has become necessary to audit and adjust these liabilities; and they are found to amount thus far to the sum of $191,100.73 of undisputed debts; while a large amount is in dispute, and still other amounts are known of, but not yet proved. He left no property with which to discharge those liabilities, except the present, and contingent future, interest in the patent, and the house he lived in, of small value."

The true legacy left by Charles Goodyear was of course the process of vulcanization of rubber, left not to his immediate family, but to all mankind, to all the millions who have lived since that memorable day in January of 1839 at Woburn, Massachusetts.

(To Be Concluded)

Rubber Models Increase Sales

MOST burial vaults (underground mausoleums) are equipped with bases which resemble inverted cake pans with the narrow edge resting on the ground and acting as the sole support for a heavy casket and the steel dome cover of the vault. Supporting all this weight it is natural that the narrow rims would cut into the earth. The Galion Metallic Vault Co., Galion, Ohio, recently improved on this construction by developing one which features a heavy steel plate over the entire bottom of the vault, every inch of the plate contacting the earth.



The new type of vault is considered an important improvement in the field of mortuary supplies, but sales were temporarily stymied by selling difficulties. In a funeral home, a vault is displayed with a casket resting on the base and the vault dome raised above the casket. To show the new improvement on the base of the vault meant that somebody had to lift approximately 750 pounds. Galion's problem was finally solved by means of rubber.

A molded rubber table model was made for Galion by the Perfect Rubber Company, of Mansfield, Ohio. It is in three sections, one representing a piece of earth with the deep cuts of the ordinary narrow rim base impression and but a slight impression of the new type non-imbedding base. Scale models of the two different types of base fit in place over the impressions. When the two bases are lifted a comparative story is very quickly told. All three sections are appropriately lettered to tell the story more easily. Since Galion's salesmen have been using the rubber models, sales have increased appreciably.

An Index to Vol. 44 of THE RUBBER AGE appeared in the April, 1939, issue. Additional copies available on request.

New Equipment

Humphrey Flow Indicator

THE Humphrey Flow Indicator, a new instrument developed for installation in circulating oil lines on machinery, has been placed on the market by the Industrial Instrument Company, 96 East Miller Avenue, Akron, Ohio. The new indicator operates in connection with a needle valve in an oil circulating line to

the bearings in a machine, one unit with a valve being placed in each branch line to a single bearing. Should the oil line plug up between the pump and bearing, the indicating hand on the unit moves to a "danger" zone marked on its dial to inform the operator that something is wrong at the bearing involved. Application can be made on lines carrying pressure to 150 pounds. Overall dimensions of the new flow indicator are approximately 2¾ by 7 inches. A number of these instruments were recently installed on Banburys in the new tire plant of the Ford Motor Company.

Armstrong-Bray Belt Cutter

A NEW belt cutter, suitable for rubber, leather and fabric belts up to 8 inches in width, has been introduced by Armstrong-Bray & Co., 304 North Loomis Street, Chicago, Illinois. The new cutter is designed to end the common practice of cutting a square end on a power transmission belt with a pocket knife, a wasteful practice at best since it generally takes several cuts to cut the exact square end necessary to obtain uniform tension on a laced belt. The Arm-

strong-Bray cutter holds the belt securely against a side guide, while a knife is drawn down a track that assures an accurate square cut. The track also prevents the knife from slipping and injuring the operator. Light in weight and compact, the cutter can either be bolted down to a bench or carried right out to the job.

Easy Electric Sander

A PORTABLE all-electric reciprocating motion sanding, rubbing and polishing machine has been introduced under the name of the Easy Electric Sander by the Detroit Surfacing Machine Co., 7433 West Davison Street, Detroit, Michigan. It is said

to be adaptable to a wide range of new and refinishing applications on flat, curved and irregular surfaces, whether sanding, rubbing or polishing, from the finest precision work to the roughest castings. It is suitable for hard rubber, wood, metal, granite, slate, leather and other surfaces. The balance, light weight, comfortable grip, convenient switch control, smooth reciprocating motion of the new sander assures easy, one-hand operation on horizontal or vertical surfaces. Ample power is furnished by a ball-bearing motor which operates from any A.C. or D.C. electric light socket. A filter installed in the motor cap removes injurious grit and debris from the air before entering motor. A new improved type of abrasive holder is another feature of the new machine.

Acid-Resisting Bearings

A LINE of bearings and rollers molded of non-metallic materials that resist acids and organic solutions, and which have application in various rubber manufacturing processes, has been developed by the Gatke Corporation, 228 North LaSalle Street, Chicago, Illinois. The accompanying illustration shows a roller

and bearing assembly after eleven months of service in an electrolytic pickling tank. Both rollers and bearings were submerged in the acid and subjected to the combined effect of hot, dilute sulfuric acid, iron sulfate, electrolytic action, mechanical wear and shock. The pickling acid was the only bearing lubrication.

An Index to Vol. 44 of THE RUBBER AGE appeared in the April, 1939, issue. Additional copies available on request.

Book Reviews

Annual Report on the Progress of Rubber Technology—1938. Edited by T. J. Drakeley. Published by the Institution of the Rubber Industry, 12 Whitehall, London, S.W. 1, England. 7¼x9¾ in. 141 pp. Price to members, 2/6 (approximately 60c); to non-members, 10/6 (approximately $2.60).

This is the second issue of the annual reports being issued by the I.R.I. to keep its members and non-members abreast with developments in the field of rubber technology. As in the first number, developments in various branches of the industry—from planting to manufacturing—are reviewed by authorities in the respective fields. Complete bibliographical references are given at the end of each review. Author and subject indexes are included. The subjects covered, and the authors of each, follow herewith:

History, General and Miscellaneous, and Statistics, by J. P. Griffiths; *Planting and Production of Raw Rubber and Latex,* by J. Grantham; *Properties, Applications and Utilization of Latex, Including Treatment of Fabric with Latex,* by F. H. Cotton; *Raw Rubber,* by R. W. West; *Synthetic Rubber,* by W. J. S. Naunton; *Testing Equipment, General, and Specifications Other Than Latex,* by George Martin; *Compounding Ingredients, General, Vulcanizing Accelerators, Antioxidants and Softeners,* by W. J. S. Naunton; *Fabrics and Textiles,* by W. Knight.

Chemical and Physical Properties of Vulcanized Rubber, by R. W. West; *Tires,* by J. G. Mackay; *Belting,* by G. F. Payne; *Rubber Hose and Tubing,* by J. Kirkwood; *Cables and Electrical Insulation,* by C. J. Beaver; *Footwear,* by A. Johnston; *Games and Sport Accessories,* by J. G. Mackay; *Mechanical Rubber Goods,* by H. Rogers; *Roads,* by G. E. Coombs; *Rubber Flooring,* by A. W. F. Chatfield; *Surgical Goods,* by C. R. Pinnell; *Textile-Rubber Composites, Solvents, Cements,* by W. N. Lister; *Sponge Rubber,* by J. D. Campbell; *Hard Rubber,* by H. A. Daynes; *Works Processes, Materials, Including the Treatment of Raw Rubber in the Factory, and the Treatment of Vulcanized Rubber,* by B. L. Davies; *Machinery and Appliances,* by Colin Macbeth.

Booklets, Catalogs, etc.

Neoprene Latex Type 57. (Report No. 39-3). By Benton Dales and William H. Ayscue. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼x9¼ in. 18 pp.

A general description of Neoprene Latex Type 57, an alkaline aqueous dispersion of neoprene of good mechanical and chemical stability, together with a number of suggestions for its compounding, are given in this report. In addition, some data is given on the vulcanization of neoprene latex compounds and properties of neoprene latex films. Formulas for the production of household gloves and for the coating of canvas gloves by the dipping process are also included. A number of patents covering the more important general processes for making coagulating dip goods and for molding by gelation are furnished in the report.

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South American Handbook—1939. H. W. Wilson Co., 950 University Ave., New York City. 4½ x 7 in. 714 pp. $1.00.

The latest edition of this guide to South and Central America has been revised and brought up-to-date. Like previous editions it furnishes specific data of interest to travelers and to traders on all of the various countries to the South of the United States. A great deal of "fresh" information has been added to the new edition, which is the sixteenth of the series.

Die Rahmung des Hevea-Latex mittels Kolloiden. (The Creaming of Hevea Latex by Means of Colloids). By C. F. Vester. Rubber Foundation of Holland, 182 Heerengracht, Amsterdam, Holland. 6¼x9½ in. 30 pp. (In German only). (A limited number of copies are available from THE RUBBER AGE).

The results of a number of experiments on the creaming of Hevea latex with such colloidal agents as tragacanth, Konjaku meal, Tragon meal, pectin, sodium polyacrylate, etc., are given and the effects reviewed in this booklet. The author draws attention to some processes in the milk industry which closely resemble the formation of various emulsions secured mechanically. A condensed version of this booklet, under the title of "Note on the Mechanism of Creaming of Hevea Latex," was given by the author at the Rubber Technology Conference held in London last year, which is included (in English) in the printed "Proceedings."

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Inside the Flame. By F. Burnham MacLeary. Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass. 8½x11 in. 32 pp.

The story of the manufacture, properties and uses of carbon black, told in this booklet, was designed to supplement a sound motion picture produced under the title, "Inside the Flame," for Cabot by Caravel Films, Inc. The booklet, profusely illustrated with still photographs from the sound picture, skillfully traces the production of carbon black, compares its physical characteristics with other blacks, discusses its reactions with other materials, and stresses its importance in the manufacture of rubber products, quick-drying inks, lacquers, paints and plastics, and a variety of other finished products. Although written from a technical angle, the text is so worded that even the purely uninitiated will have a firm understanding of carbon black and its functions after reading the booklet.

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Quit Your Skidding. (Revised Edition). B. F. Goodrich Co., Akron, Ohio. 3¼x6¼ in. 32 pp.

Additional helpful driving hints are included in this revised edition of Goodrich's popular little manual. Hints on how to avoid skidding, how to drive on wet and icy roads, how to pull cars out of skids, how to take a curve, and other similar suggestions are given. A story on the development of the company's new Life-Saver Tread Silvertown is also included, along with a question-and-answer section on the safe driving hints covered in the manual.

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Ideal Catalog and Handbook. Ideal Commutator Dresser Co., Sycamore, Illinois. 8½x11 in. 84 pp.

The company's varied line of equipment is illustrated and described in this combined catalog and handbook. Data is furnished on motor maintenance equipment, motor repair equipment, variable speed transmissions, cleaning equipment, factory production equipment and materials, electric soldering tools, electricians' tools and materials, and electrical testing and recording devices. An index is provided.

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Truck and Bus Tire Service Manual. Original Equipment Tire Division, B. F. Goodrich Co., Akron, Ohio. 8½x11 in. 14 pp.

The purpose of this service manual is to help large users of original equipment tires to receive normal service and lowest cost per mile by pointing out and suggesting ways to overcome the factors which contribute to premature tire wear. Such factors as loads, tread wear, speed, air and spacing are discussed. The manual is amply illustrated.

•

Saco Speed Reducers. (Catalog 7838). Stephens-Adamson Mfg. Co., Aurora, Ill. 8½x11 in. 8 pp.

Complete engineering information on the company's line of speed reducers is given in this fully illustrated catalog. Advantages of the equipment, such as increased efficiency, ratio differentials, small floor space required, etc., are discussed. Uses are also given consideration.

Mathematics of Water Absorption by Rubber. By J. T. Blake and H. A. Morss, Jr. Simplex Wire & Cable Co., Cambridge, Mass. 7¼x9¾ in. 18 pp.

The absorption of water by rubber may be of two types —that which eventually reaches an equilibrium and that which seems to proceed indefinitely. As a result, it is difficult if not impossible to relate the course of the absorbtion to a single mathematical expression. In this booklet, a reprint of the paper delivered by the authors at the Rubber Technology Conference held in London last year, a number of empirical relations are drawn and discussed. This paper is part of the printed "Proceedings" of the Conference.

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Dynamics of Automobile Demand. General Motors Corporation, 1775 Broadway, New York City. 8½x11 in. 140 pp.

Based upon papers presented at a joint meeting of the American Statistical Association and the Econometric Society last December, this booklet contains those papers which attempt to apply in the field of consumers' durable goods some of the mathematical techniques which have been used, for the most part, in the field of perishable or semi-perishable goods. In brief, the combined papers present a broad analysis of the many factors affecting automobile demand.

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Apparatus for Electrolytic Conductivity Measurements. (Catalog EN-95). Leeds & Northrup Co., 4911 Stenton Ave., Philadelphia, Penna. 7¾x10½ in. 40 pp.

The latest forms of the company's apparatus for making all well-established electrolytic conductivity measurements in plants and laboratories are listed and described in this catalog. A general discussion of research, routine, and industrial measurements is included, while information on recent developments in technique and apparatus for precise measurements is given. Suggested combinations of equipment are illustrated and discussed.

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Rubber Tired Farm Tractors. By Warren S. Lockwood. British Rubber Publicity Association, 19 Fenchurch St., London, E.C. 3, England. 5½x8½ in. 12 pp. (Also available from Crude Rubber Development Bureau, Munsey Building, Washington, D. C.).

This booklet, a reprint of an article which appeared in the March, 1939, issue of the *India Rubber World*, describes and illustrates the use of rubber tires on various farm tractors. The results of comparative tests between rubber-tired and steel wheels on tractors, held by a number of colleges and universities, are reported in the booklet.

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McDonnell Boiler Water Level Control. McDonnell & Miller, Wrigley Building, Chicago, Ill. 8½ x 11 in. 20 pp.

Attractively printed in two colors, this catalog describes and illustrates the various controls made by the company for installation on steam boilers to help guard against the costly dangers of low water. Data on boiler water feeders, low water cut-offs, liquid level controls, automatic protective devices, and other types of controls is given.

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Modern Plastic Material Testing Machines. (Bulletin No. 17.) Tinius Olsen Testing Machine Co., Philadelphia, Penna. 8½ x 11 in. 12 pp.

This bulletin illustrates and describes modern machines featured by the company for testing materials in the fast growing plastics industry. Data is given on apparatus for testing tension, compression, flexure, stiffness, distortion, impact and other physical characteristics.

•

Independent Laboratory Services. American Council of Commercial Laboratories, 1415 Park Ave., Hoboken, N. J. 8½ x 11 in. 12 pp.

The aims and purpose of the American Council of Commercial Laboratories, comprised of leading research and testing laboratories, are given in this brochure, as well as data showing the scope of work and equipment of member laboratories. A map showing the geographical distribution of headquarters of members is also included.

American Seamless Flexible Metal Tubing. (Bulletin SS-25). American Metal Hose Branch, American Brass Co., Waterbury, Conn. 8½x11 in. 24 pp.

Discussions on the proper use of seamless flexible metal tubing for conveying steam, liquids and gases, as well as for controlling vibration and connecting misaligned and moving parts are part of this new catalog. The role played by the tubing in product design is also discussed. Complete engineering data and specifications, with simple installation rules, are given.

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Important Books. Chemical Publishing Co., Inc., 146 Lafayette St., New York City. 5½x8½ in. 36 pp.

The latest edition of this catalog of technical books covers domestic and imported books on chemistry, physics, mathematics, metallurgy, engineering, general science, formularies, etc. A subject index makes it a simple matter to locate any book listed. Copies of the catalog are sent free upon receipt of stamps to cover postage.

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Metermax Combustion Control for Boiler Furnaces. (Catalog N-01-163). Leeds & Northrup Co., 4911 Stenton Ave., Philadelphia, Penna. 7¾x10½ in. 32 pp.

The application of Metermax combustion control to boiler furnaces of every major type—pulverized coal-fired, stoker-fired, gas and oil-fired—is featured in this catalog. Not only is each type of installation illustrated pictorially, but methods of application are indicated by schematic diagrams. A double-page diagram enables even non-technical readers to grasp the essentials of the system.

•

Modernizing Industry With the Electric Eye. Lipman Engineering Co., 415 Van Braam St., Pittsburgh, Penna. 8¾x11¼ in. 8 pp.

This bulletin is devoted to a complete description of the company's Photo Electric Type PC-3 Counting Equipment, which is capable of 600 counts per minute or 36,000 counts per hour. Its accuracy, ruggedness, reliability, and ease of installation are stressed. Charts and diagrams indicate the operation of the mechanism.

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Goodrich Products—1939. B. F. Goodrich Co., Akron, Ohio. 8½ x 11 in. 24 pp.

It has become a practice with the Goodrich organization to issue a report of product advancement along with the annual financial statement. This latest report traces developments during 1938. Data appears on tires and tubes, rubber "sandwich" wheels, Torsilastic springs, latex sponge seats, expansion joints, etc.

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Chemicals by Glyco. Glyco Products Co., Inc., 148 Lafayette St., New York City. 6 x 9 in. 72 pp.

The latest edition of this catalog describes the emulsifying agents, synthetic resins, waxes, plasticizers, fatty acid esters of glycerine, and the glycols manufactured by the company. In addition, suggested formulae and other useful information for the manufacture of numerous types of products are included.

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Day Ro-Ball Stabilized Gyrating Screens. (Bulletin No. 375). J. H. Day Co., Cincinnati, Ohio. 8x10½ in. 12 pp.

The claimed advantages of the company's Ro-Ball stabilized gyrating screens over competitive makes of equipment are fully detailed and discussed in this new bulletin. In addition, several new applications of the screens are illustrated and described, including some in the rubber industry.

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Who? What? Why? Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y. 4x9 in. 8 pp.

The functions of the consulting chemist and chemical engineer are outlined in brief form in this pamphlet. Illustrative examples are given to show methods of cooperation on different types of problems with industry, with attorneys and with individuals.

Editorial Comment

Latex Imports

CONSIDERABLE curiosity has been evidenced lately by members of the rubber and allied industries, particularly by those who watch the published statistics, as to the sharp decline in latex imports registered last year. The question most often asked is: "Is the use of latex dropping off so rapidly?" The answer is an emphatic "no," and a brief review of the situation should help clarify the issue.

Annual imports of latex into the United States have long followed an erratic course. According to figures compiled by the Department of Commerce, a total of 3,394 tons was imported in 1926. It dropped sharply the following year to 1,495 tons, increased to 4,007 in 1928, and went down to 3,729 in 1929. An upward trend then developed reaching the record total of 23,185 tons, valued at $10,213,670 in 1937. Last year imports dropped to 11,878 tons, valued at $4,147,318. The value of latex has also followed an erratic course.

Naturally, a drop in imports of approximately 50% is bound to lead to the impression that the use of a material is declining rapidly. That is not the case with latex. In 1937 importers of latex accepted shipments of as much of the material as they could garner. Warehouses were filled to capacities. Business in the first six months of 1937, it will be remembered, was booming. When the business index fell off sharply in the last few months of 1937 and continued into 1938, latex importers called a halt on imports. But the consumption of latex was as great in 1938 (as far as can be determined) as it was in the previous year. This latex naturally came from the accumulated stocks, but the records show a much greater amount of imports in 1937 than they do for 1938.

Fair Price for Rubber

THE question of what is a fair price of crude rubber — to consumer as well as producer — has long been a controversial one. Many English producers claim that a price around twenty-five cents is fair, while other producers, principally Dutch estate owners, have set an unofficial figure of about twenty cents. American manufacturers believe that an 18-cent price would be closer to the mark. Some light is shed on the subject by a recent analysis made by Charles Hope and Company.

The London firm analyzed the results of 40 representative rubber producing companies. The cost of production of these companies for 1937 was approximately 10½ cents per pound, permissible shipments under the restriction scheme for the year averaging 83¾%. Actually, the companies involved in the analysis produced only 81%. The "overall" cost of 10½ cents per pound made no allowances for depreciation.

The capitalization of the 40 companies averaged approximately $250.00 per planted acre. Their output for the year averaged 347 pounds per planted acre. The return on their capital, based on the average price of 19 cents per pound for standard ribbed smoked sheet, was, therefore, approximately 11½%.

Of course, the figures revealed by the analysis are not necessarily complete. Then, too, the percentage of permissible shipments of basic quotas affects the return percentage considerably; the cost of production naturally increases as output decreases. The fact that it takes a rubber estate at least seven or eight years before it can show any return must also be considered. Despite all these factors, however, the analysis reveals that a figure under 20 cents seems to be more equitable for producer and consumer than one above that level.

CURRENT • NEWS of the Rubber Industry

JUNE, 1939

WORLD CONVENTION HELD BY ENGINEERS

The World Automotive Engineering Congress, representing the most ambitious program ever conceived by the Society of Automotive Engineers, was held last month. The first sessions were held in the Hotel Pennsylvania in New York City on May 22 and continued through May 28. The participants then went on to Indianapolis where they saw Wilbur Shaw win the 500-mile International Automobile Sweepstakes. From Indianapolis the group moved on to Detroit for a three-day session which wound up on June 2, plant inspections occupying most of their time. The meeting then moved to San Francisco where it was finally concluded on June 8.

Of the 67 papers scheduled to be read at the technical sessions, approximately 40 were delivered during the stay in New York. As usual, the papers covered a wide ground, ranging from current practices to predictions concerning the car of tomorrow. Interesting applications of rubber and the role played by rubber in the modern automobile were referred to in several instances.

References to Rubber Products

In one paper, entitled "Some Aspects of Frameless Car Design," W. D. Appel, of General Motors Overseas Operations, stated that noise levels do not increase as cars are made stiffer. "We have found," he said, "that rubber insulating the rear springs from the axles and the body and front suspension from the frame extension helps tremendously in reducing this noise level." Frameless cars, which have been more widely adopted abroad than in this country, can be made just as quiet in operation as any car of conventional construction, according to Mr. Appel.

Speed has very little effect on cornering force under practically all conditions, according to A. W. Bull of the U. S. Rubber Company, who delivered a paper on "Tire Behavior in Steering" at one of the Detroit sessions of the Congress. He defined cornering force as being the force which is developed by the tire when it is compelled to travel in a direction differing from that in which it is being steered.

Increasing inflation pressure increases cornering force, Mr. Bull pointed out, and since higher inflation pressures usually mean harder ride, this factor is a good illustration of the need for compromise between ride and stability. The trend in recent years toward lower and lower inflations in order to improve the ride is an important factor in car stability, he said, and then went into a discussion of stability which in his belief is difficult to define in terms of absolute units.

H. O. Mathews, automotive engineer of the Public Utility Engineering and Service Corp., also paid some attention to tires in his paper. He advised the use of 6-ply instead of 4-ply tires on passenger cars, stating that the mileage was increased 25% against an increase in cost of only 18%. He said that the mileage increases as much as 40% if the same procedure is followed in the operation of light trucks. He also stated that many commercial units equipped with special bodies are under-tired and warned users to give special consideration to the tire equipment on such units.

10,000,000 Flat Tires

About 10,000,000 flat tires and blow-outs in 1938 troubled drivers of the 26,000,000 passenger cars registered in the United States, according to the Automobile Club of New York. The figures were revealed as the result of a national study of motorists' mishaps made by the parent American Automobile Association. The high total of tire failures was attributed largely to the continued use of dangerously worn tires.

Loses Tire Valve Suit

The Dill Manufacturing Co., Cleveland, Ohio, lost its suit to obtain the patent rights to a new type of tire valve last month. On May 25, the company's suit against William F. Goff was dismissed in the Common Pleas Court at Akron. Dill contended that Mr. Goff had developed the valve while in its employ as a development engineer and therefore was entitled to the patent rights. The valve, manufacturing rights to which have been assigned to the Ohio Injector Co., Wadsworth, Ohio, is said to be made of four parts, its construction eliminating the intricate process employed in other valves of adhering rubber to metal. Leakage of air is said to be prevented by a compression seal.

TIRE MANUFACTURERS ALTER BONUS RATES

Following the Federal Trade Commission's recent cease-and-desist order against alleged price discrimination by the U. S. Rubber Company, and acceptance of the order by the company, practically all of the major tire companies have revised their bonus schedules for dealers. The revision has considerably improved the position of the smaller dealer.

Although under the former system both large and small dealers received the same discounts, generally 20 and 5 and 5% off the list price, only the larger dealers were able to secure substantial bonuses at the end of the year based on total of volume sales. These bonuses ranged from 1% for sales of $1,000 up to a maximum of 15% for sales of $50,000 and over.

Small Dealers Are Favored

Under the new schedules, the small dealer will receive a discount of 20% plus an additional 12½%, which is approximately 3% better than he has been getting, while large dealers, generally classified as "distributors," will get 20%, plus 5%, plus 17½%. Bonuses now start at 1% for annual sales of $15,000 and go up to only 2½% for sales of $50,000 and over.

The net effect of the new schedules is that the larger dealer's position is approximately the same (what he loses in bonuses he makes up in bigger discounts), while the smaller dealer will be paying approximately 3% less for the tires he sells. For the present, the tire manufacturers are absorbing any losses accruing from this revision in price schedules. Tire experts believe the move is a good one since it narrows the buying margin between large and small dealers, aiding the latter and preventing the former from cutting prices.

Honor Paid Dr. Dieterich

In tribute to the memory of the late Dr. E. O. Dieterich, for many years manager of the physical research laboratories of the B. F. Goodrich Co., a mural has been presented to the University of Iowa. Dr. Dieterich was graduated from the University in 1916. The mural, painted by Richard F. Gates, an assistant research student in the University's art department, is 23 x 5 feet in size, and depicts primitive man through the ages.

GROUP DISCUSSES TRADE ASSOCIATION

CLEVELAND, June 12 *(By Special Correspondent)*—Representatives of several rubber manufacturing companies met here today to discuss the advisability of forming a new rubber association the prime function of which would be to assure an adequate supply of crude rubber and latex in the Western Hemisphere. The meeting was called by Stewart N. Clarkson, president of Stewart N. Clarkson, Inc., specialists in trade relations, 420 Lexington Avenue, New York.

In opening the meeting, Mr. Clarkson outlined the story behind it and paid particular tribute to W. H. Spencer, head of the Alliance Rubber Company, who has been fostering the idea of such an association for many years. Mr. Spencer then took the floor and emphasized the possible difficulties of obtaining supplies of crude rubber from the Far East in the event of war. He stressed the fact that American rubber manufacturers were completely dependent on foreign sources for their supplies.

Various other speakers were heard, many of them pointing out that several departments of the Government, particularly those concerned with war, agriculture and commerce, were interested in the possibilities of cultivating rubber in this hemisphere. Some of them felt that if the rubber industry presented a united front on the subject it might be possible for these governmental agencies to secure appropriations to start early development work.

After a thorough discussion of the present situation it was decided that it would be appropriate for the Rubber Manufacturers Association to sponsor some of the aims aired at the meeting and Mr. Clarkson was delegated to present the views of the assembled delegates to that organization. In the event the R.M.A. does not take the necessary steps to increase its membership so that it will be more nearly representative of the rubber manufacturing industry, then it was the feeling of the delegates that an active effort should be made at once to proceed with formation of a new association to be tentatively called the American Crude Rubber Association.

In addition to Mr. Clarkson and Mr. Spencer, those attending the meeting included: W. G. Lerch (Cascade Rubber), J. M. Slattery (Fisk), R. M. Graham (General), H. J. Bechtold and J. R. Keach (Ohio Rubber), K. L. Milligan (Pioneer Rubber), W. B. McIntosh (Pyramid Rubber), C. E. Reiss (R-C-A Rubber), John A. Kopeske (Rubberset), and H. W. Osborn (Stalwart Rubber). Mr. J. W. Vander Laan, Cleveland district manager of the U. S. Bureau of Foreign & Domestic Commerce, was also in attendance as an observer.

At the conclusion of the meeting, an advisory committee to work with Mr. Clarkson on future moves was named. Members of this committee are Messrs. Spencer, Slattery, Graham, Reiss and Keach.

Coming Events

June 16. Akron Rubber Group, Annual Outing, Silver Lake Country Club, Akron, Ohio.

June 21. Chicago Rubber Group, Annual Outing, Glenbard Golf Club, Glen Ellyn, Illinois.

June 26-30. Annual Meeting, A.S.T.M., Chalfonte-Haddon Hall, Atlantic City.

July 14. Boston Rubber Group, Annual Outing, Weston Golf Club, Weston, Mass.

Sept. 13-15. Goodyear Centennial Celebration (in conjunction with 98th Meeting of the A.C.S.), Boston, Mass.

Oct. 15. 40th National Automobile Show, Grand Central Palace, N. Y.

Oct. 16-20. National Safety Congress & Exposition, Atlantic City, N. J.

Dec. 4-9. 17th Exposition of Chemical Industries, Grand Central Palace, N. Y. C.

CARBON BLACK FILM IS SHOWN BY CABOT

Thomas D. Cabot, treasurer, Carleton Bloom, sales manager, and other members of Godfrey L. Cabot, Inc., carbon black manufacturers of Boston, Mass., played hosts to members of the rubber and other industries at a preview of "Inside the Flame," a new talking motion picture, held on May 18 in the studios of Caravel Films, Inc., in New York City.

The film is not so much a story of the manufacture of carbon black, although such manufacture is traced from start to finish, as it is a pictorial and diagrammatic study of what happens inside the typical carbon black flame. Throughout the film, narrated by Aloise Havrilla, noted radio announcer and commentator, emphasis is placed on the necessity for accurate adjustment of the innumerable flames to secure a uniform grade of carbon black and on the minute variations in flame jets for various grades of black.

Methods of testing and grading carbon black are also depicted in the new film, while attention is called to the constant efforts of the laboratory technician to improve upon existing grades so that finished rubber and other products will give even better performance than they do at present. The film concludes with views of the packing and shipping methods employed in the Cabot plants.

Following presentation of the film, guests at the preview were given copies of a booklet bearing the same title, "Inside the Flame." This booklet, handsomely illustrated and printed in two colors, was designed to supplement the film. The booklet, copies of which can be secured by writing direct to Godfrey L. Cabot, Inc., is reviewed elsewhere in this issue.

QUOTA RAISED 5% FOR THIRD QUARTER

The International Rubber Regulation Committee, meeting in London on May 16, raised the quota of permissible exports of crude rubber to 55% of basic quotas for the third quarter of the current year. An export quota of 50% has been in force since the first of the year. The additional allowance was less than had been anticipated.

Permissible exports from the signatory countries in the restriction scheme, including Siam and French Indo-China, under the 55% allowance will amount to 226,619 tons as compared with 208,313 tons permitted during the second quarter, an increase of approximately 20,000 tons. Countries outside of the restriction agreement will probably ship less than 10,000 tons in all during the third quarter of the year.

In a talk before the Akron Export Club in Akron on May 25, E. G. Holt, chief of the Leather and Rubber Division of the Bureau of Foreign & Domestic Commerce expressed concern over the increase in permissible exports of only 5%. He stated that American rubber manufacturers will need a 15% increase in the fourth quarter quota if the rubber market is to keep its balance. (Mr. Holt's pertinent remarks on the current crude rubber situation will be found elsewhere in this issue).

SWEDISH FIRM MAKING U. S. "ROYAL" TIRES

According to F. B. Davis, Jr., chairman and president of the U. S. Rubber Company, a cooperative agreement has been concluded between that company and the Svenska Gummifabriks, A.B., whereby the Swedish company will hereafter produce U. S. "Royal" Tires for the Swedish market. Albin Johannson is president of Svenska Gummifabriks, A.B., which is owned by the Kooperative Forbundet, and produces the "Gislaved" tire.

The agreement involves an exchange of engineers and other experts between the United States and Sweden. In addition, a large portion of the tire-building material to be used in the fabrication of the Swedish-produced U. S. "Royal" and the "Gislaved" tires is to be supplied from the United States, including chemicals, cord and crude rubber, the latter to be supplied by U. S. Rubber's plantations in the Far East.

Rubber Displays Moves

Rubber Displays, Inc., manufacturers of rubber forms for the display of wearing apparel and other uses, recently moved into larger quarters at 3727 North Palmer Street in Milwaukee, Wisconsin. The company, headed by R. H. Martynotte as manager, has opened a New York office and reports that it is hard pressed to fill current orders. Everett Chemical Company, suppliers of latex and latex compounds, occupies the same Milwaukee quarters as Rubber Displays.

CHEMICAL ENGINEERS HOLD AKRON MEETING

The American Institute of Chemical Engineers held its 31st semi-annual general meeting at the Mayflower Hotel in Akron, Ohio, on May 15, 16, 17. The meeting featured committee and technical sessions, a banquet, visits to industrial plants, a golf tournament and special receptions. Webster N. Jones, of the Carnegie Institute of Technology, is president of the Institute.

The development and application of the so-called synthetic rubbers were stressed in several papers delivered at the technical session held on Tuesday afternoon, May 16. Materials discussed included neoprene, Koroseal and Plioweld. Pyroflex, a new acid and alkali-resistant thermoplastic, was also the subject of one of the papers.

Dr. Geer Principal Speaker

Dr. William C. Geer, of Ithaca, N. Y., formerly associated with the B. F. Goodrich Company, was the principal speaker at the banquet held on the night of May 16. Emphasizing the fact that 1939 marked the 100th anniversary of the discovery of vulcanization, Dr. Geer stated that the future of the rubber industry will be as brilliant as has been its past if chemical engineers retain the vision, imagination and persistence of Charles Goodyear.

Dr. Geer again attacked the popular belief that the discovery of vulcanization was accidental. Using an electric hot plate, he dropped a mixture of rubber, sulfur and white lead on it in the same proportions as did Goodyear, and then said, "I have repeated this experiment over and over again and I am convinced that the only 'accident' in this test and the only factor with which he (Goodyear) could have had nothing to do was the temperature of the stove."

Upon the foundation laid by Charles Goodyear, other research men have built, particularly since 1900, to make rubber increasingly useful, Dr. Geer declared. He paid special tribute to George Oenslager for the discovery and introduction of organic accelerators. In concluding his address, the speaker declared that no technological unemployment can be ascribed to the rubber industry. R. P. Dinsmore, assistant factory manager of Goodyear, was toastmaster at the banquet.

Abstracts of the Papers

Titles, authors and abstracts of the four papers of particular interest to the rubber industry follow herewith:

Neoprene as a Construction Material for the Chemical Industry, by E. R. Bridgwater (DuPont): The physical and chemical properties of neoprene are discussed. Its use as a lining material, as a coating material for fans and centrifugal pumps, etc., are cited. Among the properties specifically discussed are abrasion resistance, oil resistance, contamination of chemicals and solvents by neoprene, effect of heat, effect of sunlight, effect of temperature on physical properties, specific heat and heat conductivity, and commercial applications. Some of the uses for which neoprene is not suited are also discussed.

Koroseal as an Engineering Material, by Frank K. Schoenfeld (Goodrich): This paper contains a summary of data pertinent to the industrial applications of Koroseal in resisting corrosion, for protecting workmen, and avoiding contamination of products. The value and limitations of rubber in the chemical industry are summarized and those properties of Koroseal which fit it for service that rubber cannot meet are emphasized. An outline of the major fields of application for Koroseal in chemical service is presented. Included are service data on Koroseal-lined tanks, Koroseal piping and tubing, Koroseal gaskets, packing, belting and Koroseal-treated protective clothing.

Plioweld in the Chemical Industry, by N. E. Kimball and F. H. Manchester (Goodyear): The advantages of rubber-lined steel equipment have been made available to the chemical engineer through the use of Plioweld and similar adhesives to unite rubber and metal. The utilization of such equipment meets many of the corrosion problems of the industry by satisfying requirements of chemical resistance, low first cost and maintenance, sturdiness of construction, temperature limitations, and safety. Views are shown of various applications as well as of the steel blast equipment and vulcanizer in the Goodyear factory.

Pyroflex Constructions for Acid and Alkali Service, by C. A. Rauh (Maurice A. Knight): Pyroflex is an acid and alkali-resistant thermoplastic now being used extensively as a lining and sealing member in plant equipment handling acids and alkali solutions and gases. It is also used under extremely severe service conditions as an integral part of combination constructions utilizing such acid-proof materials as ceramic and carbon brick and glass, with structural members composed of steel, concrete, brick masonry, or wood. The Pyroflex acts as a sealing as well as a bonding and cushioning layer. The inner structure of ceramic or carbon brick actually floats in Pyroflex.

New Goodrich Tire Lines

Six new lines of "Super-Traction" tires for off-the-highway service, especially in mud and snow, have been announced by the B. F. Goodrich Co., Akron. Included are new truck and bus tires in a complete range of sizes, both balloon and high pressure. These tires have broader, flatter treads with deep, self-cleaning design for traction in mud and gumbo. Other tires in the new lines were engineered for use on fire apparatus, on ½ and ¾ ton delivery trucks, on graders and other road maintenance machinery, on free rolling wheels on scraper wagons and miscellaneous heavy duty earth mover equipment, and on 1½ ton trucks.

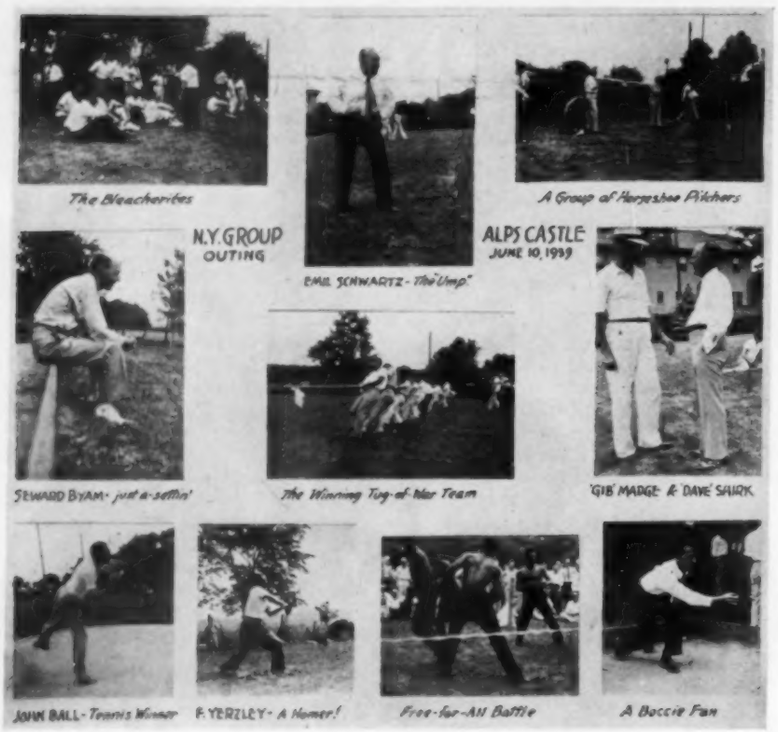
Wins Patent Decision

The Court of Appeals for the Second Circuit, New York City, handed down a decision on April 10 upholding the Samson-United Corporation, of Rochester, N. Y., in its suit against Sears, Roebuck & Company, the Chicago mail order house, in which it charged infringement of its rubber-bladed fans, covered by U. S. Patent No. 2,095,223. The Excel Auto Radiator Company of Chicago defended the suit in behalf of Sears.

DISPLAY U. S. ROYAL FOAM SPONGE PRODUCTS

Augmenting its national advertising campaign on U. S. Royal Foam Sponge for mattresses and upholstering, a group of displays are currently being featured in the street windows of U. S. Rubber's general office building at 1790 Broadway in New York City. Each window depicts some specific use to which the foam sponge has been placed, including seat cushions on planes, trains, and buses; mattresses for hospitals; miscellaneous products for the home; etc. The photograph reproduced herewith is of the window devoted to use in pullman cars.

N. Y. GROUP HOLDS ITS ANNUAL OUTING


The Bleacherites
N.Y. GROUP OUTING
ALPS CASTLE JUNE 10, 1939
EMIL SCHWARTZ - The Ump"
A Group of Horseshoe Pitchers
SEWARD BYAM - just a-settin'
The Winning Tug-of-War Team
'GIB' MADGE & DAVE SAURK
JOHN BALL - Tennis Winner
P. YERZLEY - A Homer!
Free-for-All Battle
A Boccie Fan

What was generally termed one of the finest and most enjoyable outings staged by the New York Group, Rubber Division, A.C.S., was held on Saturday, June 10th, at the Alps Castle in Preakness (Paterson), New Jersey. Approximately 160 members and guests were in attendance. Although previous outings have been held by the Group at the Alps Castle, the fact that the place is under new management and the new management is far more cooperative than the old, contributed greatly to the general enjoyment.

A complete program of sports events, including golf, tennis, soft ball, boccie, horseshoe pitching and races, featured the outing. A free-for-all boxing bout, with five one-gloved participants in the ring at one time, was still another feature. Beer was served freely throughout the day and both luncheon and dinner were excellent. A vote of thanks was given at the end of the day's activities to Fred Traflet (Pequanoc Rubber) who acted as Chairman of the Outing Committee.

In the soft ball tournament the "Peddlers" beat the "Chemists" and the "Single Men" beat the "Married Men." The "Peddlers" were captained by J. Miscall (Flintkote) and the "Single Men" by Ed Osberg (*India Rubber World*). The team headed by J. DeC. Van Etten (Vansul) won the tug-of-war contest. Winners in the golf tournament were: *Low Gross*—J. De Reimes (Bakelite); *Low Net*—S. W. Mackenzie (U. S. Rubber); *Kicker's Handicap*—W. S. Woodward (American Zinc Sales) and H. W. Smith (Thompson-Weinman); *High Score*—J. R. Keating (Binney & Smith).

Winners of the various races were as follows: *Fat Men*—George McNamara (Pequanoc Rubber); *Flyweight*—Al Schwartz (Wishnick-Tumpeer); *Three-Legged*—Bruce Atchinson (Pequanoc Rubber) and George McNamara; *Backward*—Al Schwartz; *Sack*—Bruce Atchinson. Other events produced the following winners: *Boccie*—George Grove and E. B. Snyder (N. J. Zinc), first prize, and R. D. Gartrell and R. H. Gerke (U. S. Rubber), second; *Tennis*—John Ball (Vanderbilt), with E. T. McKay (Manhattan Rubber), runner-up; *Horseshoe Pitching*—W. F. Lamela (Okonite), first, and Paul Grinwis (Manhattan Rubber), second; *Baseball Throw*—Bruce Atchinson.

Members in charge of the various events were: *Golf*—G. Provost (U. S. Rubber); *Soft Ball*—Logan Lawrence (DuPont); *Races*—Larry Edland (Vanderbilt); *Boccie*—J. Carroll (Carroll Co.); *Tennis*—M. E. Lerner (THE RUBBER AGE); *Horseshoe Pitching*—W. Lamela (Okonite); *Baseball Throw*—Dave Scott, Jr. (Henry L. Scott Co.); *Tug-of-War*—J. R. Keating (Binney & Smith). J. Miscall (Flintkote) acted as master of ceremonies, ably assisted by W. Lingvall (U. S. Rubber). J. DeC. Van Etten (Vansul) was in charge of the beer.

Prizes were awarded to winners in the various events. Several door prizes, including radios, clocks, zipper envelopes, military brushes, etc., were also distributed to holders of lucky numbers. All prizes for this year's outing were purchased with funds taken from the treasury of the Group and no solicitations were made of suppliers. Peter P. Pinto (THE RUBBER AGE) and B. Brittain Wilson (*India Rubber World*), secretary of the group, were in charge of the prizes, with able assistance given them by Pete Murawski (Du Pont).

Walter H. Grote (United Carbon) entertained throughout dinner by rendering excellent violin solos. He was ably accompanied by one of his friends, Jimmy Berg, Viennese pianist and composer, leader of one of the popular orchestras. Accordion player-singers also entertained before, during and after dinner.

Changes at N. J. Zinc

J. E. Hayes, president of the New Jersey Zinc Company, New York City, has announced that Marshall L. Havey has been elected a vice-president of the company. It was also announced that Ralph M. Neumann has been appointed general sales manager and Arthur E. Mervine assistant general sales manager.

Members and guests attending the annual outing of the New York Rubber Group

"OIL NIGHT" IS HELD BY LOS ANGELES GROUP

The concluding supper meeting for the season drew an attendance of 130 members and guests of the Los Angeles Group, Rubber Division, A. C. S., held in the Rainbow Room of the Mayfair Hotel, Tuesday evening, June 6.

The night was known as "Oil Night," the subject of petroleum in its relation to rubber being the general topic under consideration. The Union Oil Company showed a moving picture on the origin of natural oil deposits. Dr. C. D. Barnes of the company's research laboratories spoke on the subjects suggested by the picture and answered questions from the floor.

Charles Lamb, vice-president and general manager of the West American Rubber Company, spoke briefly on "Rubber-Oil," qualifying for the subject by the fact that his company manufactures a great many rubber appliances used in the oil fields.

Three door prizes and a special prize were donated by Godfrey L. Cabot, Inc., through B. E. Dougherty. Each prize was a picnic set valued at $25 retail. The special prize was won by L. O. Smith of the National Standard Company while the door prizes were won by Charles Prowten of the Latex Seamless Rubber Company; J. D. Fowls of The Olympic Rubber Company; and William F. Michalak of the MacClatchie Manufacturing Company.

There will be no dinner meetings during the summer months. The next indoor gathering will be held on the first Tuesday in October. The big fishing excursion will take the place of the July meeting.

32,000,000 Units Seen

Based on the early spring upturn in the tire replacement business, Col. Charles E. Speaks, president of the Fisk Rubber Corporation, predicts 32,000,000 unit sales in this field for the current year. Col. Speaks found early buying to be an encouraging sign that previous peaks and valleys of the tire buying seasons are beginning to level out. He credited educational efforts on the part of manufacturers for the new buying habits.

Rubber Feed Line

Driving a Class E Lyman boat, equipped with specially-designed rubber feed hose instead of the usual copper lines, James Kastner, of South Akron, Ohio, placed second in the runabout class in the recent running of the 1939 National Outboard Motor Race from Albany to New York City. The hose, developed by the B. F. Goodrich Co., has a lining made to resist the solvent action of gasoline, thereby preventing any possibility of rubber particles coming loose and clogging the carburetor. Since racing drivers attribute one-third of power failures to breakage of copper lines, the new rubber feed hose is expected to find a ready market in this field.

Arrange First Outing

The Chicago Group, Rubber Division, A. C. S., will hold its first annual outing on Wednesday, June 21, at the Glenbard Golf Club on Roosevelt Road on the edge of the village of Glen Ellyn, Illinois, approximately 21 miles from downtown Chicago. A golf tournament will be the keynote of the outing and the golf club will be open for members and guests throughout the day. O. Selander, of the Wilson Sporting Goods Company, is chairman of the Golf Committee. Dinner will be served in the clubhouse at 7:15 P.M. Reservations should be made with Ben W. Lewis, Room 1812, Tribune Tower, Chicago. Tickets for the day are $2.25.

Boston Outing July 14

The annual summer outing of the Boston Group, Rubber Division, A. C. S., will be held on July 14, 1939, at the Weston Golf Club, Weston, Massachusetts, the same location at which last year's outing was held. Plans have been made for a golf tournament, baseball game, tennis, and other outdoor sports. Dinner will be served in the new banquet room of the club at 7:00 P.M. Prizes will be awarded to the winners of the various events. Reservations should be made with J. C. Walton, Box 1071, Boston, Mass.

R.M.A. SPONSORING 1939 SAFETY CAMPAIGN

A Summer Tire Safety Campaign, similar in scope and purpose to the nationwide drive for tire safety conducted for the first time last year, was scheduled to get under way by June 10. Committees to direct the campaign, which is under the sponsorship of the Rubber Manufacturers Association, have been appointed in most of the larger cities throughout the country.

In order to enable tire dealers in smaller towns and cities to cooperate in the campaign, the R.M.A. prepared a special dealer package, containing store banner, window trim, tire inserts, circles for gas pumps, lapel buttons, windshield stickers, and other material, which is being sold for $1.00 per package. The entire campaign emphasizes the necessity of replacing worn or defective tires.

The Rubber Manufacturers Association has been particularly active in recent months with regard to tires. It has started publication of a series of bulletins devoted to causes of tire failures, each bulletin outlining the problem, stressing recognition pointers, and informing the tire user how best to avoid failures. Such factors as rim bruise, misalignment, mis-matching, bead failures, overload failures and wheel balance are subjects of bulletins published to date.

Chicago Hears Schwartz

Emil W. Schwartz, Works Laboratory, General Electric Co., Bridgeport, Conn., was the principal speaker at a meeting of the Chicago Group, Rubber Division, A. C. S., held at the Hotel Sherman in Chicago on May 12. Mr. Schwartz's paper, entitled "Some New Aspects in the Use of Synthetics as Applied to Electrical Insulation," represented the first announcement by General Electric of the conclusion of the initial part of a development program started four years ago to manufacture insulated wire of higher dielectric strength with lower wall thickness. The speaker described developments to date and discussed the excellent results obtained thus far. Major experiments have centered on the processing of pure gum stocks, using resins such as Marbon and Pliolite to secure the desired characteristics.

held on June 10th at the Alps Castle in Preakness, near Paterson, New Jersey

FINANCIAL NEWS

MANSFIELD OFFERING IS OVERSUBSCRIBED

The public offering of 47,615 shares of common stock of the Mansfield Tire & Rubber Co., Mansfield, Ohio, made on May 16 by Otis & Company, at $15.50 per share, was heavily oversubscribed and the subscription books closed the same day, according to the Cleveland office of the financial house. The offering marked the first public financing of Mansfield Tire since its incorporation under the laws of Ohio in 1912.

Of the shares included in the offering, 13,800 were purchased from the company with the proceeds to go toward reimbursing the company for accrued expenses incidental to enlarging its plant, and for additional working capital. The balance of the shares was purchased from stockholders. The principal officers and all other stockholders (except three) retained 90% of their holdings.

Mansfield Tire manufactures and sells tires and tubes for passenger cars, buses and trucks. All of its output is sold in the replacement field and to a few volume accounts. Its plant has a capacity of 10,000 tires and 8,600 tubes per day and is currently operating on a five-day week.

Net earnings available for common stock in the past three years, according to the prospectus issued in connection with the public offering, were $245,007 for 1936, $309,694 for 1937, and $427,395 for 1938, equivalent to $1.61, $2.03 and $2.80 per share, respectively.

For the first quarter of the current year, the company reports net earnings of $178,265, equal after preferred dividends to $1.17 each on 152,202 common shares outstanding on completion of the initial public financing discussed above.

NEW SPALDING PLAN GIVEN STOCKHOLDERS

A plan for financial recapitalization which provides for merger of the present New Jersey company into A. G. Spalding & Bros., Inc., newly incorporated under the laws of Delaware, has been given to stockholders of A. G. Spalding & Bros. A special meeting has been called for June 22 to vote on the plan.

In a letter to stockholders, Charles F. Robbins, president, stated that under New Jersey laws it would be necessary to apply all future earnings to make up a net deficit of $4,640,031 accumulated from 1931 to October, 1938, before using any of the earnings for dividends. The company earned its first profit since 1931 in the first half of its current fiscal year, which started on November 1, 1938.

Under the terms of the merger, holders of each present share of first preferred stock, on which accumulations are $51.92 a share, will be entitled to receive $1.92 in cash, $100 in new 50-year 5% debentures, and 1 share of new no-par value first preferred stock, entitled on redemption or liquidation to $50.00. Each new share will be entitled also to one vote and to cumulative dividends of $1.50 annually for three years until November 1, 1942, and to $2.00 annually thereafter.

Holders of each present share of second preferred stock will receive either one share of new second preferred stock or 12 shares of new common stock, at their option. Each new second preferred share will be entitled to $160 on liquidation or redemption, to one vote, and to non-cumulative dividends of $7.40 a share annually from November 1, 1939, before any common dividends may be paid. Present common stock will be exchangeable share-for-share for new common stock of $1-par value.

United Shoe Machinery

Year Ended Feb. 28: Net income, after deducting $1,300,000 as provision for Federal income taxes, amounted to $9,477,129. After deduction of $414,688 for preferred dividends, the income was equivalent to $3.95 per share of common stock based upon the average number of shares outstanding during the year. The income was made up of $6,684,484 received from general operations and $4,092,644 received as dividends from associated companies, interest and other dividend income.

United Carbon Co.

First Quarter: Net profit of $459,202, equal to $1.15 each on 397,885 shares of no-par common stock, after deducting expenses, taxes, depreciation, depletion and Federal and state taxes. In the corresponding quarter of the previous year the company reported a profit of $438,364, or $1.10 a share. Current assets on March 31, 1939, amounted to $4,031,811 and current liabilities to $966,690.

National-Erie Corp.

For 1938: Net loss of $23,840, attributed to decrease in volume of sales and selling prices and higher labor costs. The balance sheet at the end of December, 1938, showed total current assets of $384,140 against total current liabilities of $67,797. Operations for the first quarter of the current year are said to have resulted in a small profit.

Lee Rubber & Tire

Six Months to April 30: Consolidated net profit of $652,972, equal to $2.55 each on 255,565 shares of capital stock, which compares with $314,105, or $1.23 a share, reported for the six months ended April 30, 1938.

STOCKHOLDERS VOTE READJUSTMENT PLAN

Stockholders of the Seiberling Rubber Company, at a special meeting held in Akron, Ohio, on June 1st, approved the capital readjustment plan sponsored by the management and offered for their consideration last month. Approval was accorded by holders of 77% of the preferred and 59% of the common stock. Anticipated opposition to the plan, hinted at by large stockholders, failed to materialize.

The action of the stockholders clears the way for immediate registration with the Securities and Exchange Commission of new prior preference stock and also payment of dividends on a new Class A preferred stock soon after the prior preference stock issue has been sold. The plan wipes out dividend arrearages on the present 8% cumulative preferred stock through issuance of new stock. (For details of the plan, see page 106, May, 1939, THE RUBBER AGE.)

J. Penfield Seiberling, president, told the stockholders at the special meeting that Seiberling's consolidated net sales in the six months ended April 30 increased 27% to $4,400,593 from the $3,444,870 reported for the corresponding period of the previous fiscal year. Net income before taxes amounted to $403,576, which compares with a loss of $44,955 for the six months ended April 30, 1938. Total current assets as of April 30, 1939, were reported at $3,177,170 against current liabilities of $1,649,224.

Raybestos-Manhattan, Inc.

First Quarter: Net income of $316,401, or 50 cents per share, after providing $174,361 for depreciation and $77,169 for Federal and state income taxes. Total assets at March 31 amounted to $17,846,014, including $9,109,023 of current assets, equivalent to nine and one-half times the current liabilities. The company has no banking or funded debts, or other capital obligations outstanding.

Dayton Rubber Mfg. Co.

Nov. 1 to Feb. 25: Net income of $167,422 after all charges, equal to 77 cents each on 176,670 common shares after dividend requirements on the Class A preference stock.

Brown Rubber Co.

First Quarter: Net income of $4,943, equal to 2 cents each on 200,000 shares of common stock. The company reported a net loss of $11,827 last year.

Reduce Interest Rate

United States Rubber Company has arranged with all the holders of its First Mortgage and Collateral Trust 4¼% Bonds, Series A, due July 1, 1958, for a reduction in the interest rate to 3⅝% per annum, effective July 1, 1939. After the July 1, 1939, sinking fund payment of $1,000,000, the total bonds outstanding at that date will be $43,000,000.

Names in the News

FRANK C. MILHOFF has resigned from his position as vice-president in charge of sales for the Quaker City Rubber Co., Philadelphia, Penna. MR. MILHOFF, who has had a long career in the rubber industry, having been with Miller for 16 years before its acquisition by Goodrich, has not yet announced his future plans.

MYRON T. BENNETT, for the past 13 years with the N. J. Zinc Sales Company covering the Chicago territory, has been transferred to New York, where he will act as assistant manager of the Pigment Division. He will work directly under R. M. NEUMANN, manager of the division.

EDWARD J. HEGARTY, formerly with the promotion staff of the New York World's Fair, and previously associated with Westinghouse as merchandise sales manager, has joined the Mansfield Tire & Rubber Co., Mansfield, Ohio, as merchandise manager.

JEROME "JERRY" SHAW, editor of *Tires Magazine* for the past 19 years, has been appointed general manager of that publication. He has been connected with the automotive industry for more than twenty-five years.

GEORGE E. PRICE, JR., general purchasing agent, Goodyear Tire & Rubber Co., Akron, was elected national vice-president for the sixth district of the National Purchasing Agents Association last month. MR. PRICE, who is also president of the Purchasing Agents Association of Akron, delivered an address on "Protection Against Safety Hazards in Equipment and Material" at the convention of the national association held in San Francisco the week of May 22.

E. G. DAVIES, affiliated with C. K. Williams & Co., Easton, Penna., for many years, has been elected secretary of the company. MR. DAVIES assumes general direction of the sales and credit departments, while W. H. LUCKING, associated with the firm for the past nine years, will have immediate charge of sales.

DR. RICHARD WEIL, who was associated with the Continental Gummiwerke, A.G., Hanover, Germany, for more than 30 years, has become a resident of the United States and has joined the Faultless Rubber Co., Ashland, Ohio, where he will be in charge of the technical staff. He is recognized as one of the world's outstanding rubber technologists.

LT.-COL. SIR WALROND SINCLAIR, K.B.E., has been nominated by the General Council as president of the Institution of the Rubber Industry (England) for the year 1938-39. S. T. ROWE, retiring president, was nominated as a vice-president. Nomination of the Council is equivalent to election.

R. W. KNOWLES, manager, raw products division, Ohio Rubber Co., Willoughby, Ohio, has announced his retirement from active business after spending twenty-three years in the rubber industry in this country and abroad. He plans to move to a farm near Grand Rapids, Mich., which he has owned for a number of years.

JOHN A. MACMILLAN, chairman of the board, Dayton Rubber Mfg. Co., Dayton, Ohio, was elected a member of the board of directors of the Ohio Chamber of Commerce recently. He will represent the southwestern section of Ohio on the board.

G. E. HOPKINS, for many years technical director for the Bigelow-Sanford Carpet Co., Inc., Thompsonville, Conn., recently resigned from that post to join the United Shoe Machinery Corporation, Beverly, Mass.

HARLAN L. TRUMBULL, manager of chemical research, B. F. Goodrich Co., Akron, was one of a group completing twenty years of service with the company last month. He will receive his service pin at a ceremonial to be held some time this month.

IAN D. PATTERSON, chief chemist and development manager of the Wolverhampton (England) Plant of the Goodyear Tire & Rubber Company, has been transferred to Akron, where he will do special work in the development department there.

WILLARD H. COBB, factory manager of the Passaic (N. J.) Plant of the U. S. Rubber Company, has been appointed general manager of the mechanical goods and general products divisions. His new post includes supervision of the manufacture of rubber thread and "Lastex" yarn.

CARL PHARIS, president, Pharis Tire & Rubber Co., Newark, Ohio, was tendered a testimonial dinner by employees and business associates on May 31. He was presented with a pastel portrait of himself. W. A. PATTERSON, vice-president and sales manager of Pharis Tire, made the presentation.

New Rubber Manufacturer

The Elastic Milk Corporation, headed by Henry De Witz, has been organized at 2122 West Vliet Street, Milwaukee, Wisconsin, for the manufacture of rubber novelties, including toy soldiers, sailors and chess men. Mr. De Witz is said to have perfected a method for molding latex articles in approximately six minutes at room temperature. Charles and Chester Connell are other members of the new firm.

RUBBER DIVISION CALLS FOR PAPERS

Because it is the desire of the Centennial Program Committee and of the officers of the Rubber Division, A.C.S., that the technical sessions which the Division will hold during the coming Fall meeting in Boston will make up a full two-day program, an invitation has been extended to the entire membership of the Division to submit original papers dealing with vulcanization or allied subjects pertaining directly or indirectly to vulcanization.

Originally, it was the intention of the Committee to present a program devoted solely to the subject of vulcanization, since the meeting will commemorate the 100th anniversary of the discovery of vulcanization by Charles Goodyear, and accordingly papers dealing with various phases of the subject were solicited and secured. However, it has since been determined that the papers promised will not require two days for presentation and therefore additional papers are desired.

In the event the number of papers received in response to the Division's appeal is not sufficient to round out a full two-day program, then papers of outstanding merit on subjects other than vulcanization will be accepted for inclusion in the program. The deadline date for receiving papers is July 14th. All papers should be sent to H. I. Cramer, secretary of the Division, c/o University of Akron, Akron, Ohio.

It has also been announced that in addition to its own technical program, the Rubber Division is cooperating in two symposia during the Fall meeting: (1) Plastics and Resins from Petroleum, on Monday, September 11, with the Petroleum Division and the Paint & Varnish Division; (2) X-Ray Structure of High Molecular Weight Substances, on Tuesday, September 12, with the Division of Colloid Chemistry and the Division of Inorganic Physical Chemistry.

Redeem $18,000,000 Issue

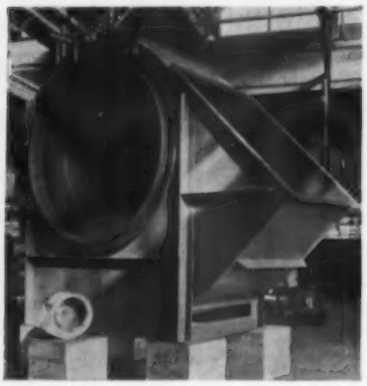
The B. F. Goodrich Co., Akron, has called for redemption on August 2 its 15 year 6% convertible gold debentures, due June 1, 1945, amounting to $18,319,200. The redemption will be carried out with the proceeds from bank loans totaling $18,000,000 recently arranged through Goldman, Sachs & Co., together with cash from the company's treasury. The new bank loans, which bear interest of only 3%, will mature on June 1, 1945.

DuPont Reduces Prices

Price reductions on three types of accelerators—Thionex, Tetrone A and Tepidone—have been announced by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. The new prices are: Thionex, $2.35 per pound in 100-pound drums; Tetrone A, $2.70 per pound in 150-pound drums; Tepidone, $1.45 per pound in 125 and 275-pound drums.

LARGE UNITS HANDLED BY GIANT VULCANIZER

Large fan housings and other big pieces of equipment used in the handling of acid fumes may now have



Plioweld rubber lining applied in a single vulcanizing operation at the Akron mechanical goods plant of the Goodyear Tire & Rubber Co. Typical of the units which may be handled in the company's giant new vulcanizer, which is 15 feet in diameter and 45 feet long, is illustrated in the accompanying photograph. The fan housing shown is for a 12-bladed fan, 6 feet-7 inches in diameter, and the height of the housing is 10 feet-7 inches, length is 11 feet-9 inches, and width is 5 feet. Shown for purposes of comparison is a small fan housing designed for a 12-inch fan.

"RUBBERIZED" HOSE APPEARS ON MARKET

Richard, Boggs & King, of Chicago, the firm which pioneered the merchandising of a host of products made of Pliofilm, Goodyear's rubber hydrochloride material, has introduced women's hose impregnated with a special rubber substance developed by Goodyear. The new hose, called Durafilm Hose, is said to have twice the wearability of comparable stockings finished by other means.

Although very little is known of the new process, it is understood that the solution used binds the silk fibers of the hose together, greatly reducing the fuzziness ot the thread, so that there are fewer fibers projecting to catch on any object. Pulling of the fibers leads to runs in this type of hose. Laboratory tests indicate that Durafilm Hose have a flexibility more than four times that of other hose.

Sees Consumption Increase

World consumption of crude rubber within the next ten years will reach over 1,500,000 tons annually, a 50% increase over the peak consumption of 1937, according to a statement by J. M. Slattery, manager, rubber and cotton department, Fisk Tire Company. This growth, Mr. Slattery said, will be based upon new developments in aviation, plastics and a multitude of other new uses for rubber, with the automobile business remaining one of the major consumers. Rubber, he believes, will also be a dominant factor in solving the noise problem in large cities.

Hillside Combine Special

Under the name of the Hillside Combine Special, a new tire for agricultural use has been developed by the Goodyear Tire & Rubber Co., Akron. Available in one size only, 11.25-36, the new tire will fit approximately 80% of all hillside combines now in use. The Hillside Combine Special has two massive ribs which grab the soil firmly and hold the combine in line whenever there is a tendency for it to slip down grade. It is of 10-ply construction, which permits higher inflation pressure, effectively reducing bouncing which sometimes occurs with ordinary tires under extreme conditions.

Using Goodrich Tires

The small, two-cylinder automobile pioneered by Powel Crosley, Jr., head of the Crosley Radio Corporation, Cincinnati, Ohio, which made its first public appearance last month at the Indianapolis Speedway and at the New York World's Fair, is equipped with Goodrich tires. A specially-designed tire, only 4.25-12 in size, is used. While small, the tire is really an oversize when inflated to 32 pounds pressure. It is of four-ply construction, has a safety tread, and carries the Silvertown trade-mark.

U. S. AIDING BRAZIL CULTIVATE RUBBER

Dr. Walter T. Swingle, horticulturist of the Department of Agriculture, Washington, D. C., sailed for South America last month to help Brazil to regain its status as an important producer of rubber and quinine. He has been "loaned" by the Department to the Brazilian Government.

Dr. Swingle stated before he sailed that he planned to discuss with Brazilian scientists certain recent discoveries that may once again make rubber cultivation profitable in that country. He said that many South American planters are already developing a new technique in rubber cultivation, and with the proper aid from the authorities will soon be producing quality crude rubber equivalent to Far Eastern grades.

Brazil, which produced approximately 95% of the world's supply of rubber at the turn of the century, now produces only enough rubber annually to supply the needs of American manufacturers for a single day. At present, the only rubber trees in the country, outside of those cultivated by Ford, which are still largely in the experimental stage, are wild.

Building Rayon Plant

The American Viscose Company is constructing a new plant for the manufacture of rayon in Front Royal, Virginia. The larger portion of rayon turned out by this plant, which will not be ready for quantity production until late next fall, will be consumed by automobile tire manufacturers.

Obituaries

William G. Manley

William Gardner Manley, associated with the rubber industry in various capacities for the past seventeen years, died at the age of 55 on May 23 in a hospital at Columbia, South Carolina, following a brief illness. Born in St. Louis, Missouri, Mr. Manley was raised in Buffalo, N. Y., and when a young man was employed by one of the larger insurance companies in New York City. Later, he obtained a government position and went to the Canal Zone in 1905, working there for six years despite the prevalence of yellow fever. In 1912 he joined the old Diamond Rubber Company in Akron and two years later became associated with Firestone. He remained with Firestone for 15 years, serving at one time as sales manager for the southern division. During N. R. A. code days, Mr. Manley was associated with the Rubber Manufacturers Association as head of its special field organization, leaving the Association after serving for two years. At the time of his death he was southern district sales manager for the Fisk Tire Company. He leaves a widow, two sons and a daughter.

Wilbur J. Watson

Wilbur J. Watson, internationally known bridge designer and designer of the Goodyear zeppelin dock at Akron, died on May 20 of a heart ailment at his home in East Cleveland, Ohio, after a ten-day illness. He was 68 years of age. At the time of his death, Mr. Watson was acting as consulting engineer for both the Goodyear and Firestone organizations. One of his last assignments was the design of the Firestone exhibit at the New York World's Fair. He leaves a widow and two daughters.

James Cavanagh

James Cavanagh, who was associated with the research division of the United Shoe Machinery Corporation, Boston, Mass., since its organization in 1899, in which capacity he was well known to many rubber manufacturers, died of a heart attack at the age of 69 on April 12. He leaves a widow and three daughters.

Los Angeles News

Funeral services were held at Forest Lawn Memorial Park, Glendale, May 17, for H. H. Huntington, 73, founder of the Huntington Rubber Company, Los Angeles, the first retreading firm in the city and the firm using the first full circle mold. Mr. Huntington died suddenly of a heart attack at his home. The ashes were taken to Petaluma, California. Last fall a banquet attended by rubber industry men from the entire Los Angeles section honored Mr. Huntington on the 25th anniversary of the establishment of his business. Mr. Huntington was born in Canada but spent most of his mature life on the west coast.

W. J. Voit, president of the W. J. Voit Rubber Corporation, has left Los Angeles for a three-month tour of portions of Africa and other distant parts of the world.

The Rubbercraft Corporation of California has begun construction of a warehouse 20 by 100 feet in dimensions, one story, at the plant at Torrance for the warehousing of raw materials. The building will be of sheet metal on a concrete foundation and will be completed about July 1.

Work has been completed on a large warehouse and factory unit building at the local plant of the U. S. Rubber Company.

Garvin Drew, of A. Schrader's Son, chairman of the Los Angeles Rubber Group, left June 7 for an extensive trip through the eastern states.

Dan Lloyd was re-elected head of the Rod and Reel Club at the Goodyear plant. Howard Williams was named vice-president, and Dick Yoha was re-elected secretary and treasurer. The club now has more than 50 members, a record number.

Plans are complete for the regular annual deep sea fishing excursion of the Los Angeles Rubber Group late in July. The group will try for the big ones in the waters around Catalina Island. Plans include a night stop-over on the Island.

Carbon Black Control

In answer to the demands of the Japanese rubber manufacturers, who absorb approximately 1,000,000 pounds of carbon black a month, the Japan Compressed Carbon Black Association has been formed to regulate the demand and supply position. Government regulations have held down the importation of carbon black into Japan with the result that the rubber manufacturers faced a shortage, according to the office of the American commercial attache at Tokyo. The new Association, which includes ten manufacturers of carbon black, will unify imports from the United States. In addition, the Rubber Manufacturers Association of Japan and the Electric Wire Industrial Association of Japan will cooperate with the Association for smoother distribution of carbon black in that country.

Whitaker Heads Committee

Dr. M. C. Whitaker, vice-president of the American Cyanamid Company, has accepted the chairmanship of the Advisory Committee of the 17th Exposition of Chemical Industries. The Exposition, which is again under the personal direction of Charles F. Roth, will be held at Grand Central Palace, New York, December 4 to 9, marking the 25th year of its service to the chemical and allied industries. New chemical products and materials of construction, with examples of their latest applications, are expected to make the coming Exposition more interesting than all of its predecessors.

Fourth Colloid Course

The Department of Chemical Engineering of the Massachusetts Institute of Technology, Cambridge, Mass., has announced the Fourth Special Summer Program in Theoretical and Applied Chemistry and Physics of Matter in the Colloidal State, under the direction of Dr. Ernst A. Hauser. The course will run for five weeks beginning July 24, 1939. As in the past, the program will consist of lectures, round-table discussions, practical training in the laboratory, and research work.

Gets Life Raft Contract

A contract for the production of pneumatic life rafts for the War Department's fighting planes was awarded to the Goodyear Tire & Rubber Company last month. The award, totalling $84,800, was one of four allotted to Ohio concerns. The contract calls for a special type of rubberized fabric raft which is to be carried as safety equipment on all military aircraft.

New Chilean Factory

A new rubber factory recently went into operation in Quilpue, Chile, about ten miles from Valparaiso. Among items to be manufactured are hose, tubing, packing, tile, toys, balloons, bicycle tubes and tire repair equipment. The factory is being operated by the Industria de la Goma, S.A., the officers being mostly Italians or Chileans of Italian origin. T. G. Levi Cattelari is technical director.

Drop Prices on Chemicals

The Naugatuck Chemical Division of U. S. Rubber Co., New York City, has announced price reductions on three of its rubber chemicals, *i.e.*, Laurex, Monex and Sunproof. The new prices, depending on quantity purchased, are: Laurex, 10½ to 13 cents; Monex, $2.35; and Sunproof, 20 to 25 cents per pound. Naugatuck has also announced the addition of three new delayed action guanidine accelerators to its line: Delac A, for slightly delayed activation; Delac P, for moderate delayed activation; and Delac O, for maximum delayed activation. The new accelerators range from 40 to 50 cents per pound.

New England

A net profit of $77,979 for the six months ended April 30, 1939, has been reported by A. G. Spalding & Bros., Chicopee, Mass., in its quarterly income statement. It was the first profit earned in several years and compared with a net loss of $416,120 for the six months ended April 30, 1938. The figure was computed after provisions had been made for income taxes.

President Charles F. Robbins attributed the gain to the reorganization policies put into effect during the past two years. He announced the profit was earned "despite the fact that the last three months' uncertainties have had an unfavorable effect on business as a whole." Sales for April, 1939, were $3,289,899, compared with $3,387,400. Lower cost of goods this year accounted for the profit.

C. Edgar Maynard, manager of the Chicopee Falls, Mass., plant of Fisk Rubber Corp., left for Sweden in May to supervise final preparations for opening of Fisk's new branch plant in that country. Col. Charles E. Speaks, Fisk president, said it would be three months before the plant is ready to operate.

Several other large American tire manufacturers are opening new Swedish plants or making sales agreements with established Swedish tire manufacturers. This activity is due to the new tariff restrictions of Sweden which virtually bar importation of ready-made tires.

Armstrong Rubber Co., West Haven, Conn., is having plans prepared for construction of a new boiler house to contain a new boiler and an oil burner.

Most of the departments of the United States Rubber Company, Naugatuck, Conn., were closed from May 26 to May 31, the four-day weekly schedule being arranged to provide for a longer week-end. According to present plans, the annual shutdown will take place the first two weeks in July. The company is making alterations to its plant on South Main Street at a cost of $2,000.

New Rubber Goods

Flo-Ting Swim Cap

Under the name of the "Flo-Ting Swim Cap," a bathing cap with an inflatable float attached to it has been de-

veloped by the Redwine Corporation, 131 N. Main St., South Bend, Indiana. When inflated, the float or bladder attached to the nape of the cap holds the swimmer's head above water. The float is quickly and easily inflated. The Flo-Ting Swim Cap may be used as a safety device for novice swimmers or as an accessory for water sports and for lolling in the water. The caps sell for $1.00 each, and are available in red, white, blue, gray and yellow colors. The caps are being made by the B. F. Goodrich Company, Akron, which is also handling export sales.

Dayton Textile Specialties

Several new rubber items for the textile industry have been introduced by the Dayton Rubber Mfg. Co., Dayton, Ohio. One of these is a loom picker (illustrated), made of a specially compounded rubber, featuring a self-lubricating, resinous bearing around the spindle rod. Softer composition at the picker stick contacts are said to prolong life and cushion throw of the shuttle. Other new

items include lug straps, which are described as strong yet slightly flexible, and reversible picker bumpers, which are said to assure maximum resistance to shock.

Rubberized Pil-O-Bag

Pil-O-Bag is the name given to a new outing and beach bag made of rubberized, vat-dyed, fast-colored prints, merchandised by the Baer Products Co., 2 West 20th Street, New York City. Pil-O-Bag has a rubber air compartment which inflates and forms a comfortable pillow for use on all occasions. The compartment is firmly sewed into the bag and serves as a partition when deflated. A clamp is supplied on the bag to retain the air in the bag after it is blown up into pillow shape. Pil-O-Bag measures 17 inches wide and 16 inches high, and is available in a number of smart nautical and striped patterns. It retails for $1.00. The company is also featuring an attachable mat of the same pattern rubberized material. The mat, which attaches to the bag by means of snap fasteners, is 35 x 60 inches in size.

Walk-Over "Corker" Oxford

Intended for leisure wear in hot weather, the Walk-Over "Corker", a sandalized oxford for men, has been introduced by the Geo. E. Keith Co., Brockton, Mass. The shoe features an unusual sole treatment. It has an inch-

thick sole, made up of two layers of cork, divided by two rubber slip soles and a third and middle layer of crepe. This combination provides insulation against sidewalk heat. The middle sole of crepe takes away the stiffness of the entire sole and gives a cushioned effect to the foot. The "Corker" is said to be ideal for beach or cruise wear.

Studded Sure Grip Tire

Equipped with a new type tread providing rugged studs set in angular bar arrangement to insure certain forward or backward traction when the going is difficult, as in mud, snow or slush, the Goodyear Tire & Rubber Co., Akron, has introduced the Studded Sure Grip Tire. The new tire's wider tread channels between the studs prevent packing and spinning when the car or truck is traveling in mud or snow. Improved angling or spacing of the studs is said to give the tire greater tractive ability. Double cord breakers are built into the tire to furnish extra protection against bruising often encountered in off-the-highway travel.

Sponge Rubber Whiskbroom

A whiskbroom consisting of a block of sponge rubber and a handle similar to those on regular whiskbrooms, has been introduced under the trade-name of

"Rub-Whisk" by the Joe Weil Associates, 30 Rockefeller Plaza, New York City. The sponge rubber block has several notches cut into it at the lower or working end so that this new whiskbroom cleans as it brushes. The new brush is said to be good for clothes, hats, upholstery, suede shoes, and for general utility. It comes in a variety of colors and is washable. Rub-Whisk sells for approximately 50 cents in most of the leading department stores.

Onazote Race Mark

The Expanded Rubber Co., Ltd., Mitcham Road, Croydon, England, has introduced a water race mark which is easily visible from a good distance under all circumstances. Buoyancy is provided by a solid cylinder of Onazote (the sponge rubber material recently developed in England) which is 18 inches in diameter and 18 inches high. A turned spruce pole, 8 feet in length, is inserted and secured to this cylinder. The upper half of the pole is 1¼ inches in diameter and the lower half is 2½ inches in diameter. A 30-pound counterweight serves to retain the buoy in an upright position under all conditions of wind and tide.

Goodyear "Tawps"

Quietly introduced several months ago, the cushioned-leather lifts developed by the Goodyear Tire & Rubber Co., Akron, are reported to have met with distinct favor in the shoe trade. Known as "Tawps," these leather lifts for heels have a tiny rubber insert in them which cushions every step and results in the lifts actually lasting twice as long as ordinary top-lifts, according to the manufacturer. "Tawps" are said to wear evenly, thus preventing heels from fraying or squashing out at the edges.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, JUNE 9, 1939

Crude Rubber

AFTER hovering around the 16-cent level from May 10 through May 23, the price of spot on the Exchange jumped sharply to 16.33 on May 24. Heavy commission house buying and short-covering were the principal factors behind the sudden jump, although a fair amount of factory buying was also in evidence. A few days later, on May 31, the price advanced to 16.55, higher cables from London and Singapore contributing to the advance. The May 31 quotation was the high for the period; low was 15.85 on May 15. Since the first of June the price has been swinging in a fairly narrow range with today's quotation (June 9) back over the 16½-cent mark. Although the trade expected an increase in permissible quotas of signatory countries to the restriction scheme of at least 10%, the Regulation Committee meeting in London last month increased quotas by only 5%. The announcement had very little effect on the market. Quotations in the outside market, Exchange, London and Singapore, follow:

As of June 9

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.16½
July-September	—	@	.16⅝
October-December	—	@	.16¾
No. 2	—	@	.16½
No. 3	—	@	.16⅜
No. 4	—	@	.16¾
Thin Latex Crepe	—	@	.18
Thick Latex Crepe	—	@	.19
Brown Crepe, No. 1	—	@	.16¼
Brown Crepe, No. 2	—	@	.16⅛
Amber Crepe, No. 2	—	@	.16¼
Amber Crepe, No. 3	—	@	.16⅛
Brown Crepe, Rolled	—	@	.14⅞

Latex—

Normal, per lb., carload lots	—	@	.19½

Paras—

Up-River, fine	—	@	.14¼
Acre Bolivian, fine	—	@	.14½

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Buyers—June 9

July-September	8 3/16	@	8 7/16d
October-December	8 7/16	@	8½d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—June 9

July-September	—	@	8 1/16d
October-December	—	@	8 5/16d

Reclaimed Rubber

An increasing demand for reclaim has been experienced in the past few weeks. Reclaimers attribute this to the excellent position of the replacement tire field and to gradual improvement of the mechanical rubber goods' position. Hard rubber manufacturers, too, are active. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed	lb.	.06¼	@	.06¾
Washed	lb.	.10	@	.10¼

Tube

No. 1 (Floating)	lb.	.12	@	.12¼
No. 2 (Compounded)	lb.	.08	@	.08¼
Red tube	lb.	.08	@	.08¾

Tires

Black (acid process)	lb.	.07	@	.07¼
Black, selected tires	lb.	.06	@	.06¼
Dark Gray	lb.	.09¼	@	.09¾
White	lb.	.11½	@	.12
Truck, Heavy Gravity	lb.	.05½	@	.06
Truck, Light Gravity	lb.	.07	@	.07½

Miscellaneous

Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

The scrap rubber market has been rather dull in recent weeks. Stocks are reported as being plentiful. Prices on several grades of scrap, including auto tire peelings and mixed auto, have advanced slightly since our last report. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton 18.50	@	19.50
Mixed auto	ton 12.50	@	13.00
Beadless tires	ton 14.50	@	15.50
Clean solid truck tires	ton 23.00	@	25.00
Boots and shoes	ton 18.50	@	19.50
Arctics, untrimmed	ton 13.00	@	15.00
Inner tubes, No. 1	lb. .08	@	.09
Inner tubes, No. 2	lb. .03⅞	@	.04
Inner tubes, Red	lb. .03⅝	@	.03¾

Cotton

Despite continued fears of passage of the cotton export subsidy plan, cotton prices started an upward movement in mid-May which moved steadily forward until it reached a 10-cent figure on June 8, a new high level. Low for the period was 9.43 on May 15. A number of factors influenced the upward trend, the principal one being sustained mill interest. Others included unfavorable weather conditions in the south, a surge of foreign purchases, and the general feeling that whether or not the export subsidy goes through the price on new crops is likely to be dictated by loans from Washington which are likely to be as high or higher this year than last year. Recurring rumors of action on the cotton-for-rubber barter plan also aided in keeping the price up. An international cotton conference has been called in Washington on September 5. The trade linked the announcement with the idea that pending the conference the Government would not push exports along the subsidy route even if given funds by the pending agriculture bill. Quotations for middling uplands on the Exchange fol'ow:

	May 9 Close	June 9 High	June 9 Low	June 9 Close
July	8.55	9.31	9.23	9.29
October	7.98	8.45	8.34	8.45
December	7.81	8.20	8.11	8.20

(Prices Net at the Mill)

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.27¾	@ —
Peeler, carded, 23/4/3	lb.	.28¾	@ —
Peeler, carded, 15/3/3	lb.	.25¾	@ —
Peeler, carded, 13/3/3	lb.	.24¾	@ —
Egyptian, carded, 23/5/3	lb.	.39¾	@ —
Egyptian, combed, 23/5/3	lb.	.44¾	@ —

CHAFERS

Carded, American, 1 1/16"	lb.	.27¾	@ .28
Carded, American, 1"	lb.	.18	@ .24

Sheetings

48x40	36 in.	5.50	lb.	— @	.03¾
40x40	36 in.	6.15	lb.	— @	.03⅜
40x36	36 in.	6.50	lb.	— @	.03¼
48x48	40 in.	2.50	lb.	— @	.07⅛
48x48	40 in.	2.85	lb.	— @	.06⅛
56x60	40 in.	3.60	lb.	— @	.05⅝
48x44	40 in.	3.75	lb.	— @	.05⅛
44x40	40 in.	4.25	lb.	— @	.04⅜

Ducks

Enameling (single filling)	lb.	.21	@	.23
Belting and Hose	lb.	.25¼	@	—
Single filling, A grade	lb.	.09½	@	.12½
Double filling	lb.	.10½	@	.13½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM MAY 10 TO JUNE 9

Date	Spot	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Sales
May 10	16.03	16.00	16.05	16.09	16.10	16.11	16.12	16.14	16.16	16.16	16.16	16.17	16.17	——	91
11	16.05	15.97	16.02	16.08	16.09	16.10	16.11	16.11	16.11	16.12	16.12	16.13	16.14	——	106
12	15.98	15.90	15.94	15.98	15.99	16.00	16.00	16.00	16.01	16.02	16.03	16.04	16.05	——	98
13	15.98	15.90	15.92	15.95	15.96	15.98	15.99	15.99	16.00	16.01	16.02	16.03	16.04	——	90
14															
15	15.85	15.80	15.83	15.85	15.87	15.90	15.90	15.92	15.93	15.93	15.93	15.94	15.95	——	77
16	16.05	16.00	16.04	16.08	16.09	16.10	16.11	16.12	16.13	16.13	16.13	16.14	16.14	——	167
17	16.03	16.00	16.03	16.06	16.08	16.09	16.11	16.13	16.15	16.16	16.16	16.17	16.17	——	22
18	15.95	15.91	15.94	15.97	15.97	15.98	15.99	15.99	16.00	16.01	16.02	16.04	16.04	——	100
19	16.00	15.94	15.97	16.00	16.00	16.00	16.01	16.02	16.03	16.04	16.05	16.07	16.07	——	9
20	16.00	15.94	15.97	16.00	16.00	16.00	16.02	16.03	16.05	16.06	16.07	16.09	16.09	——	8
21															
22	16.05	16.00	16.02	16.04	16.04	16.05	16.06	16.07	16.08	16.09	16.10	16.11	16.12	——	48
23	16.08	16.05	16.07	16.10	16.10	16.10	16.13	16.13	16.14	16.17	16.17	16.17	16.18	——	13
24	16.33	16.29	16.35	16.42	16.44	16.46	16.46	16.46	16.46	16.47	16.48	16.50	16.51	——	327
25	16.25	16.25	16.28	16.30	16.35	16.39	16.39	16.39	16.40	16.41	16.42	16.44	16.45	——	172
26	16.33	——	16.34	16.39	16.39	16.40	16.41	16.43	16.45	16.46	16.47	16.48	16.49	——	91
27															
28															
29	16.50	——	16.40	16.42	16.45	16.48	16.48	16.48	16.49	16.50	16.51	16.53	16.54	——	51
30															
31	16.55	——	16.50	16.52	16.56	16.59	16.61	16.61	16.62	16.63	16.63	16.64	16.65	——	75
June 1	16.45	——	16.40	16.42	16.45	16.49	16.50	16.51	16.52	16.54	16.56	16.58	16.59	16.60	71
2	16.45	——	16.37	16.39	16.40	16.41	16.42	16.43	16.45	16.45	16.45	16.46	16.47	16.48	155
3															
4															
5	16.38	——	16.33	16.35	16.37	16.39	16.40	16.40	16.41	16.42	16.43	16.45	16.46	16.47	49
6	16.36	——	16.30	16.32	16.35	16.39	16.39	16.39	16.39	16.40	16.40	16.41	16.42	16.43	56
7	16.40	——	16.33	16.35	16.37	16.40	16.42	16.44	16.47	16.49	16.50	16.52	16.53	16.54	53
8	16.45	——	16.38	16.40	16.43	16.47	16.48	16.49	16.50	16.51	16.52	16.53	16.54	16.55	47
9	16.52	——	16.43	16.45	16.49	16.54	16.55	16.56	16.58	16.59	16.60	16.62	16.63	16.64	96

New York
June 12, 1939

Rubber CHEMICAL Markets

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic				
A-1 (Thiocarbanilid)	lb.	.24	@	—
A-11	lb.	.52	@	.65
A-19	lb.	.52	@	.65
A-32	lb.	.70	@	.80
A-77	lb.	.42	@	.55
A-100	lb.	.42	@	.55
Aldehyde ammonia, crystals	lb.	.65	@	.70
Altax	lb.	.55	@	.70
Butyl Zimate	lb.	3.00	@	—
Captax	lb.	.50	@	.60
Crylene	lb.	.55	@	.65
paste	lb.	.45	@	.55
Di-Ortho-Tolyguanidine	lb.	.44	@	.46
Diphenylguanidine	lb.	.35	@	.45
El-Sixty	lb.	.50	@	.65
Ethyl Zimate	lb.	3.00	@	—
Ethylidene aniline	lb.	.42	@	.43
Formaldehyde aniline	lb.	.37½	@	.42
Guantal	lb.	.40	@	.50
Heptene	lb.	.35	@	.40
Hexamethylenetetramine	lb.	.33	@	—
Lead Oleate, No. 999	lb.	.14	@	—
Witco		.15	@	—
Lithex	lb.	.18	@	.20
Methylenedianiline	lb.	.36	@	.37
Monex	lb.	—	@	2.35
Oxynone	lb.	.64	@	.80
Phenex	lb.	.50	@	.55
Pip-Pip	lb.	2.50	@	—
Pipsolene	lb.	1.55	@	1.85
R & H 40	lb.	.40	@	.41
R & H 50-D	lb.	.42	@	.43
R-2	lb.	1.40	@	1.80
R-2 Crystals	lb.	2.50	@	2.75
R-23	lb.	.40	@	—
RN-2	lb.	1.40	@	1.80
RN-2 Crystals	lb.	2.00	@	2.25
Rotax	lb.	.60	@	.65
Safex	lb.	1.25	@	1.30
SPDX	lb.	.70	@	.75
Super-Sulphur No. 1	lb.	.50	@	—
No. 2	lb.	.18	@	.20
Thiocarbanilid, drums	lb.	.24	@	.30
Trimene	lb.	.55	@	.65
base	lb.	1.05	@	1.20
Triphenylguanidine	lb.	.45	@	—
Tuads	lb.	2.65	@	—
Ulto	lb.	1.50	@	1.75
Ureka	lb.	.60	@	.75
Ureka Blend B	lb.	.60	@	.75
Ureka C	lb.	.56	@	.65
Vulcanex	lb.	.42	@	.43
Vulcone	lb.			
Vulcanol	lb.	.85	@	—
Zimate	lb.	2.65	@	—
Inorganic				
Litharge, domestic	lb.	.07	@	.07½
Magnesia, calcined, heavy	lb.	.04	@	—

COLORS

Blacks (See Compounding Materials)

Blues				
Prussian	lb.	.36	@	.37
Ultramarine	lb.	.15	@	—
Browns				
Mapico	lb.	.13	@	—
Umber, Turkey	lb	.04	@	.04½
Greens				
Chrome	lb.	.21	@	—
Chromium Oxide, bbl.	lb.	.21	@	—
Guignet's Green	lb.	.?0	@	—
Reds				
Antimony crimson, 15/17	lb.	.45	@	—
sulfur, free	lb.	.48	@	.60
Indian English	lb.	.09	@	.10
Domestic (Maroon)	lb.	.11	@	—
Red oxide, pure	lb.	.10	@	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼	@	—
Whites				
Cryptone, No. 19	lb.	.05½	@	.06½
Cryptone CB, No. 21	lb.	.05½	@	.06½
Cryptone, ZS-20	lb.	.08½	@	.08½
Cryptone, ZS-86	lb.	.08½	@	.08½
Lithopone				
Albalith, black label—11	lb.	.04½	@	.04½
Azolith	lb.	.04½	@	.04½
Ray-bar	lb.	.05⅞	@	.06⅛
Ray-cal	lb.	.05⅞	@	.06⅛
Rayox	lb.	.16	@	.19
Titanox A	lb.	.14	@	.17
Titanox B	lb.	.05¾	@	.06¾
Titanox C	lb.	.05⅛	@	.06⅛
Zinc Oxide—American Process				
American Azo: ZZZ (lead free)	lb.	.06¼	@	.06½
Anaconda, lead free	lb.	.06¼	@	.06½
Horsehead Lead Free Brand:				
Special—3	lb.	.06¼	@	.06½
XX Red—4	lb.	.06¼	@	.06½
XX Red—72	lb.	.06¼	@	.06½
XX Red—78	lb.	.06¼	@	.06½
XX Red—103	lb.	.06½	@	.06½
Kadox, black label—15	lb.	.06½	@	.06¾
Blue label—16	lb.	.06½	@	.06¾
Red label—17	lb.	.06½	@	.06¾
St. Joe, black label	lb.	.06¼	@	.06½
green label	lb.	.06¼	@	.06½
red label	lb.	.06¼	@	.06½
U. S. P—7. bbls.	lb.	.09½	@	.09¾
Zinc Oxide—French Process				
Florence White seal—7 bbls.	lb.	.08½	@	.08¾
Green seal—8	lb.	.08	@	.08¼
Red seal—9	lb.	.07½	@	.07¾
Yellows				
Cadmolith	lb.	.45	@	.50
Chrome	lb.	.14½	@	.15½
Mapico	lb.	.09½	@	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0275	@	.0625
Bone, powdered	lb.	.05½	@	.14
Carbon, compressed	lb.	.0275	@	.0625
uncompressed	lb.	.0275	@	.0625
"Certified"	lb.	—	@	—
"Spherons"	lb.	—	@	—
"Disperso"	lb.	.0275	@	.0625
"Excello," compressed	lb.	.0275	@	.0625
"Fumonex"	lb.	.03	@	.05
"Gastex"	lb.	.03	@	.05
Lampblack	lb.	.07	@	.12
"Micronex"	lb.	.0275	@	.0625
"Supreme"	lb.	.0275	@	.0625
Thermatomic—"P 33"	lb.	.04¾	@	.07¾
"Thermax"	lb.	.01¾	@	.05
United "Dixie" & "Kosmos"	lb.	.0275	@	.0625

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@	24.50
Ammonia carbonate, lump	lb.	.10½	@	.12
Asbestine	ton	13.00	@	15.00
Barium carbonate (98-100%)	ton	—	@	—
Barium Dust	lb.	.05	@	.06
Barytes	ton	23.65	@	31.15
Basofor	lb.	.04½	@	—
Bentonite	lb.	.02	@	.03
Blanc fixe dry f.o.b. works	ton	60.00	@	65.00
Calcene	ton	37.50	@	45.00
Catalpo (fact.)	lb.	.02	@	—
Chalk, precipitated				
Suprex white, extra lt.	ton	45.40	@	60.00
heavy	ton	45.00	@	55.00
Clay, Kaolin, domestic	ton	7.50	@	15.00
Aerfloted, Suprex	ton	9.50	@	21.00
Congaree	ton	9.50	@	—
Crown (f.o.b. plant)	ton	9.50	@	—
Dixie	ton	11.00	@	30.00
Dixie, Jr.	ton	9.50	@	29.00
McNamee	ton	9.50	@	22.00
Par	ton	9.50	@	22.00
Witco	ton	9.50	@	—
Cotton Flock (Dark)	lb.	.10	@	.13
Glues, extra white	lb.	.28	@	.30
medium white	lb.	.14	@	19
Kalite No. 1	ton	24.00	@	50.00
Kalite No. 3	ton	34.00	@	60.00
"Lime Crest" Industrial Filler No. 100	lb.	—	@	—
Magnesium carbonate	lb.	.07½	@	—
Mica	ton	35.00	@	44.00
Pyrax A	ton	7.50	@	20.00
Rottenstone (powdered)	lb.	.02½	@	.05
Soapstone, powdered	ton	16.00	@	22.00
Starch, powdered	cwt.	2.90	@	4.10
Talc, domestic	ton	17.00	@	20.00
Whiting, commercial	ton	17.00	@	18.00
Columbia Filler	ton	9.00	@	14.00
English Cliffstone	ton	33.00	@	43.00
Witco	ton	6.00	@	—
Wood Flour	ton	20.00	@	25.00
Zinc Carbonate	lb.	—	@	.10¾
Zinc Stearate	lb.	.23	@	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00	@	42.00
Black Diamond	ton	27.00	@	—
Genasco, solid (factory)	ton	25.00	@	27.00
Hard Hydrocarbon	ton	22.00	@	42.00
Parmr, solid	ton	25.00	@	—
Pioneer, MR, solid	ton			
Pioneer-granulated	ton			

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50	@	4.00
Rodo #10	lb.	4.50	@	5.00
Curodex 19	lb.	2.75	@	—
Curodex 188	lb.	3.50	@	—
Curodex 198	lb.	4.50	@	—
Para-Dors No. 5145	lb.	2.00	@	—
Areaklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35	@	.50
Darvan (dispersing agent)	lb.	.30	@	.50
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.11	@	—
Sunproof	lb.	.20	@	.25
Sponge Paste	lb.	—	@	.18
Tackol (tackifier)	lb.	.115	@	—
Tonox	lb.	.52	@	.61

SOFTENERS

Acids				
Acetic, 28%, bbls. 100 lb.		2.53	@	2.78
Nitric, 36 degrees	cwt.	5.00	@	6.00
Sulfuric, 66 degrees	ton	15.50	@	16.50
Acids, Fatty				
Laurex	lb.	.10½	@	.13
SL #10	lb.	.12	@	.14
Stearex Beads	lb.	.08	@	.09
Stearic, double pressed	lb.	.12½	@	.13½
Stearite	lb.	.10½	@	.11¼
Alkalies				
Caustic Soda, 76%	cwt.	2.70	@	3.55
Soda Ash, 58%, C.L.	cwt.	—	@	2.35
Oils				
Cycline Oil	gal.	.14	@	.20
Degras, bbls.	lb.	.07¾	@	.08
Fluxrite	lb.	.05½	@	.06½
Palm Niger	lb.	.05½	@	.06¾
Para-Flux	gal.	.17	@	.18
Para Lube	lb.	—	@	.05
Petrolatum, light	lb.	.03½	@	.03¾
Pigmentaroil, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
Pine, steam distilled	gal.	.64	@	.69
Rosin Oil, cmpd	gal.	.40	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rubtack	lb.	.08	@	.10
Seedine, c.l.	lb.	.07¼	@	—
Tackol	lb.	.08½	@	.18
Witco Palm Oil	lb.	.07	@	—
Witco Softener No. 20	gal.	.20	@	—
Woburn No. 8, c.l.	lb.	.06	@	—
Wobonite, c.l.	lb.	.05	@	—
Resins and Pitches				
Pitch, Burgundy	lb.	.05½	@	.06¼
coal tar	ton	19.00	@	22.00
hardwood	ton	16.00	@	22.50
pine, 200 lb. gr. wt.	bbl.	6.00	@	6.50
Pigmentar, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
R. S. L. Resin	lb.	—	@	—
Retort Pine Tar, drums	ton	20.00	@	26.00
Solvents				
Acetone, pure	lb.	—	@	.06¼
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33	@	.39
Benzene, 90%	gal.	.18	@	.23
Beta-Trichlorethane	gal.	—	@	.20
Bondogen	lb.	.98	@	1.50
Carbon, bisulfide	lb.	.05¼	@	.08
Carbon tetrachloride	lb.	.05½	@	.08
Dichlorethylene	lb.	—	@	.25
Dipentene, cml., drums	gal	.41	@	.50
Ethylene dichloride	lb.	.05½	@	.06¼
Plastogen	lb.	.07¼	@	.12½
Reogen (drums)	lb.	.11½	@	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09	@	—
Trichlorethylene	lb.	—	@	.09½
Turpentine, spirits	gal.	.43	@	.47
dest. dist., drums	gal.	.33	@	.41
Waxes				
Beeswax, white	lb.	.39	@	.45
Carnauba, yellow	lb.	.46	@	.47½
Ceresin, white, dom.	lb.	.08	@	.11
Montan, crude	lb.	.10¼	@	.11¼
Paraffin (c.l.—f.o.b. N. Y.)				
Yellow crude scale	lb.	.02¾	@	—
White crude scale 124/126.	lb.	.02¾	@	.03
Refined, 122/127	lb.	.04½	@	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50	@	2.10
Exel	lb.	1.00	@	1.40
Gel	lb.	.57	@	.77
Hipar	lb.	.65	@	.92
Powder	lb.	.52	@	.73
Resin	lb.	.52	@	.73
Resin D	lb.	.52	@	.73
White	lb.	1.25	@	1.75
Albasan	lb.	.70	@	.75
Antox	lb.	.56	@	.58
B-L-E	lb.	.52	@	.61
Flectol B	lb.	.52	@	.65
Flectol H	lb.	.52	@	.65
Flectol White	lb.	.90	@	1.15
Neozone	lb.	.52	@	.63
Oxynone	lb.	.68	@	—
Retardex	lb.	.35	@	.40
Santoflex B	lb.	.52	@	.65
Santovar A	lb.	1.15	@	1.40
S.C.R.	lb.	.33	@	.35
Stabilite	lb.	.52	@	.54
Stanilite Alba	lb.	.70	@	.75
VGB	lb.	.52	@	.61

MOLD LUBRICANTS

Areaklene	lb.	—	@	—
Cocoa Soapstock	lb.	.06	@	.08
Dipex	lb.	.06	@	.08
Lubrex	lb.	.2[illegible]	@	.30
Mold Paste	lb.	.12	@	.18
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rusco, f.o.b. Nitro	lb.	.12	@	.30
Sericite, f.o.b. N. Y.	ton	65.00	@	—
Soap Tree Bark, cut, sifted	lb.	.06	@	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.19	@	—
Black	lb.	.07	@	.11
White	lb.	.08	@	.12
Brown	lb.	.07	@	.11
Neophax	lb.	.10¼	@	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½	@	.15
Sulfur Chloride, yellow (drs.)	lb.	.04	@	—
Sulfur flour, Refined, 100% pure (bags)	cwt.	2.50	@	3.65
Commercial (bags)	cwt.	1.60	@	2.35
Telloy	lb.	1.75	@	—
Vandex	lb.	1.75	@	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1938:							
Apr.	31,042	9,495,476	13.66	250	75,797	13.55	30,792
May	27,229	8,010,250	13.13	528	167,831	14.20	26,701
June	25,983	7,150,115	12.29	399	116,458	13.03	25,584
July	21,771	5,723,381	11.74	420	127,522	13.54	21,351
Aug.	30,798	8,477,231	12.29	432	133,350	13.79	30,366
Sept.	34,383	10,650,107	13.83	803	242,324	13.48	33,580
Oct.	33,449	10,945,896	14.61	621	196,523	14.14	32,828
Nov.	31,903	10,572,345	14.79	415	146,276	15.73	31,488
Dec.	36,031	12,601,926	15.61	424	141,364	14.87	35,607
1939							
Jan.	35,255	12,313,006	15.59	468	165,663	15.79	34,787
Feb.	29,109	10,269,224	15.75	460	152,113	14.76	28,649
Mar.	43,490	15,058,279	15.46	439	171,279	17.43	43,051
Apr.	30,836	10,400,125	15.06	440	151,644	15.38	30,396

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,553	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1938:								
Apr.	188	50,423	66	25,741	1,265	444,756	889	295,690
May	229	61,756	29	8,806	900	274,652	879	279,502
June	150	41,518	34	11,496	918	276,126	695	214,420
July	223	49,099	51	16,130	869	267,491	634	209,526
Aug.	250	53,285	41	13,637	526	159,784	876	308,573
Sept.	173	37,954	39	13,896	740	225,161	683	235,242
Oct.	126	27,692	45	20,641	614	163,635	876	347,348
Nov.	59	12,923	66	24,725	307	76,452	1,020	394,082
Dec.	181	39,869	13	6,263	917	237,653	1,263	479,966
1939:								
Jan.	226	49,580	61	20,417	843	203,753	1,602	599,927
Feb.	212	46,576	15	4,426	510	129,726	1,717	657,565
Mar.	229	39,520	14	5,215	641	136,112	2,005	731,302
Apr.	180	24,584	59	18,170	281	72,024	1,018	360,739

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

	Figures on Monthly Basis: 1932*	1933*	1934*	1935*	1936*	1937*	1938*	1939
Jan.	29,648	22,645	39,190	46,636	48,631	50,879	31,265	46,234
Feb.	31,821	21,392	40,515	42,720	36,841	51,950	25,357	42,365
Mar.	29,505	17,843	47,003	42,153	42,813	54,129	32,389	50,165
Apr.	27,518	25,928	44,853	44,247	52,031	51,859	29,730	44,166
May	30,957	44,074	42,918	41,101	50,612	51,795	30,753	
June	41,475	50,743	40,147	36,156	52,772	51,860	32,540	
July	29,976	49,614	32,553	35,917	48,250	43,703	34,219	
Aug.	23,721	44,428	33,216	38,775	46,777	41,506	40,552	
Sept.	23,847	35,281	30,258	37,086	46,449	43,945	40,183	
Oct.	22,286	31,543	31,253	41,969	49,637	38,754	42,850	
Nov.	23,231	28,831	34,748	42,310	50,433	34,025	49,050	
Dec.	18,015	28,757	36,569	42,474	49,754	29,195	48,143	
Tot.	332,000	401,079	453,223	491,544	575,000	543,600	437,031	

* Revised.

Note: All figures are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078	23.0	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486	24.6	19,000
1932	75,608	77,504	23.4	16,354	1937*	185,033	162,000	29.8	28,800
1933	99,560	81,602	19.9	20,746	1938*	122,403	120,800	27.6	23,000
	Figures on Monthly Basis								
1938:*									
Jan.	8,303	7,463	23.9	28,982	July	7,668	8,777	25.6	18,956
Feb.	6,685	7,679	30.3	27,518	Aug.	11,295	11,387	28.1	18,307
Mar.	7,416	9,109	28.1	25,366	Sept.	12,961	11,969	29.8	18,540
Apr.	6,902	8,043	27.1	23,799	Oct.	14,624	12,522	29.2	19,910
May	7,406	8,613	28.0	22,042	Nov.	15,095	13,440	27.4	21,001
June	8,180	8,779	27.0	20,785	Dec.	15,868	13,019	27.1	23,000
1939:									
Jan.	13,763	13,000	28.1	21,960	July	.....	.....	...	.....
Feb.	13,093	12,626	29.8	21,390	Aug.	.....	.....	...	.....
Mar.	14,528	15,322	30.5	19,955	Sept.	.....	.....	...	.....
Apr.	14,527	13,391	30.3	22,628	Oct.	.....	.....	...	.....
May	.....	.....	...	.....	Nov.	.....	.....	...	.....
June	.....	.....	...	.....	Dec.	.....	.....	...	.....

* Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1938 were revised on June 1, 1939, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1937*	1938	1939		1937*	1938	1939
January	33,668	35,176	37,847	August	49,598	50,459	.....
February	32,034	31,861	34,595	September	47,515	46,058	.....
March	40,524	41,259	42,520	October	45,446	46,272	.....
April	43,461	43,254	43,977	November	42,718	44,991	.....
May	45,407	44,911	.....	December	39,465	41,649	.....
June	48,447	48,293	.....				
July	51,069	47,474	.....	Total	519,352	521,657	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964
1930	17,364,096	1934	12,255,118	1938	10,612,138

1939		1939		1939	
January ...	1,714,137	May	.....	September .	.....
February ..	1,442,535	June	.....	October ...	.....
March	1,730,211	July	.....	November .	.....
April	1,348,335	August	.....	December .	.....

ADVERTISING PAGES REMOVED

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1937																																
Feb.	21	21	21⅜	21¾	21⅞	21½	—	21½	21¾	21½	21⅞	23⅞	—	—	21¾	21⅞	21⅞	20⅛	20⅛	21	—	—	21¾	21¾	21⅞	21⅞	21⅞	21⅞	—	—	—	21⅛
Mar.	21⅛	21⅛	21⅛	21⅛	22½	22⅛	—	22⅜	22⅜	22⅜	23⅛	23⅞	23¾	23⅞	22⅛	24⅛	24⅜	25⅛	24¾	24⅛	24¼	24¾	25⅛	25⅛	25⅞	25⅞	26¼	26⅛	26⅜	26⅝	26½	24⅞
April	26⅞	26⅜	26⅞	—	25¾	24⅞	24⅞	24⅜	24⅜	24⅞	23⅞	23⅞	23⅜	22⅛	22⅛	22⅛	22⅛	22⅛	22⅛	22⅛	23¼	23⅜	23	23⅜	23⅜	22⅜	22⅜	21⅛	21⅛	21⅛	—	23⅛
May	21	—	21⅛	21⅛	21½	21⅛	21⅛	23½	21⅛	21½	21⅛	21½	20⅜	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	21⅛	21⅛	21⅛	21	20⅜	20⅜	20⅜	20⅛	20⅛	20⅛	—	21⅛
June	20⅛	20⅛	19⅞	19⅛	18½	18⅛	18⅜	19⅜	18½	18⅞	18⅞	19	19	18⅞	19⅜	19⅜	19⅜	19⅜	19⅜	18⅞	19⅜	19⅜	19⅜	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	18⅞	15⅞	19⅜
July	19⅜	19⅜	18⅜	18½	18⅛	19⅛	19⅜	19⅛	19⅛	19⅛	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞
Aug.	18⅜	18⅜	18⅜	—	—	—	18⅜	19⅜	19⅜	19⅜	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞
Sept.	17⅞	17¾	17¾	17⅝	17⅝	17	16¾	16¾	16⅝	16⅝	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	15⅝	15⅝	16	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
Oct.	15⅞	15⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	15⅛	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Nov.	15⅛	15½	15½	15½	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dec.	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1938																																
Jan.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Feb.	14½	14⅞	14⅞	14⅞	14½	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛
Mar.	14⅞	14⅞	14⅞	14⅜	—	—	—	—	—	—	—	14	14	14	14	14	14	13⅞	13⅞	13⅞	13⅞	13¾	13¾	13⅜	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛
April	10⅞	11⅛	11⅛	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	12	12	12	11⅞	11⅞	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛
May	11⅜	11⅜	11⅜	—	—	11⅜	11⅜	11⅜	11⅜	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
June	11⅜	11⅜	11⅜	—	14¾	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
July	15¼	15⅛	15⅛	15⅛	16	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
August	15⅛	15⅛	15⅛	15⅛	16	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
Sept.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
1939																																
Jan.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Feb.	—	15⅝	15⅝	15⅝	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
March	—	16⅛	16⅛	16⅛	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
April	—	—	16	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	—	15⅛	—	15⅛	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	—	16⅛	16⅜	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1911-1931

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	**22.48**
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	**20.55**
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	**11.98**
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	**6.17**

Average Monthly Price per Pound Since 1932

	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	4.38	3.08	9.32	13.10	14.35	21.37	14.63	15.75
Feb.	4.03	2.95	10.45	12.92	15.48	21.33	14.71	15.93
Mar.	3.35	3.01	11.01	11.51	15.89	24.09	13.55	16.26
Apr.	3.02	3.56	12.10	11.55	15.98	23.44	11.84	15.87
May	3.09	4.95	13.26	12.05	15.62	21.14	11.57	16.07
June	2.66	6.15	13.51	12.57	15.85	19.29	12.57	
July	2.89	8.01	14.60	12.10	16.49	18.86	15.37	
Aug.	3.63	7.31	15.47	11.98	16.25	18.37	16.08	
Sept.	3.84	7.30	15.36	11.55	16.46	18.55	16.15	
Oct.	3.65	7.64	13.96	12.62	16.55	16.28	16.89	
Nov.	3.44	8.66	13.04	13.15	17.97	14.60	16.24	
Dec.	3.24	8.87	12.98	13.28	20.01	15.41	16.05	
Average for Year	3.49	5.96	12.92	12.37	16.41	19.39	14.64	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1939 Mar.	1939 Apr.	1939 May	1939 June	Day	1939 Mar.	1939 Apr.	1939 May	1939 June
1	8¼	7½	7⅞	8⅛	17	8⅛	7⅞	8	
2	8⅛	—	7⅞	8¼	18	7⅞	7⅞	8	
3	8¼	8	7½	—	19	—	7⅞	8	
4	8⅛	7⅞	7½	—	20	7½	7½	—	
5	—	7⅞	7½	8¼	21	7½	7⅞	—	
6	8⅛	7⅞	7½	8⅛	22	7⅞	7½	8	
7	8⅜	—	—	8¼	23	8	—	8⅛	
8	8⅛	—	7½	8¼	24	8	7⅞	8⅛	
9	8⅛	—	7½	8¼	25	7½	7⅞	8¼	
10	8⅛	—	8		26	—	7½	8¼	
11	8⅛	7⅞	7½		27	8⅛	7⅞	—	
12	—	7½	7⅞		28	7½	7½	—	
13	8¼	7½	—		29	8	7½	—	
14	8⅛	7½	—		30	8	—	—	
15	8⅛	7⅞	7⅞		31	8	—	8⅛	
16	8⅛	—	8						

Average Monthly Price Per Pound

Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence	Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence
Jan.	6.758	10.378	7.077	7.926	Aug.	7.581	8.830	7.841	
Feb.	7.255	10.503	7.029	7.942	Sept.	7.577	8.935	7.918	
Mar.	7.450	11.766	6.590	8.120	Oct.	7.898	7.855	8.355	
Apr.	7.502	11.471	5.793	7.910	Nov.	8.572	7.080	8.111	
May	7.335	10.250	5.632	8.002	Dec.	9.580	7.332	8.005	
June	7.352	9.548	6.147		Average for Year	7.713	9.424	7.164	
July	7.696	9.136	7.464						

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1939 Apr.	1939 May	1939 June	Date	1939 Apr.	1939 May	1939 June	Date	1939 Apr.	1939 May	1939 June
1	8.81	9.24	9.70	11	8.74	9.44		22	8.83	9.73	
2	—	9.17	9.78	12	8.63	9.44		23	—	9.74	
3	8.87	9.24	9.78	13	8.66	9.51		24	8.99	9.85	
4	8.75	9.26	—	14	8.69	—		25	8.94	9.83	
5	8.79	9.31	9.92	15	8.69	9.43		26	9.09	9.81	
6	8.73	9.36	9.82	16	—	9.55		27	9.11	9.77	
7	—	—	9.91	17	8.84	9.68		28	9.20	—	
8	—	9.40	10.00	18	8.93	9.79		29	9.12	9.74	
9	—	9.58	9.99	19	8.98	9.78		30	—	—	
10	8.74	9.46		20	8.97	9.76		31	—	9.81	
				21	8.87	—					

Average Monthly Price Per Pound

	1936 Cents	1937 Cents	1938 Cents	1939 Cents		1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	11.91	13.06	8.57	8.94	Aug.	12.28	10.41	8.41	
Feb.	11.53	13.15	8.91	8.97	Sept.	12.31	9.02	8.17	
Mar.	11.43	14.46	8.92	9.00	Oct.	12.30	8.42	8.61	
Apr.	11.71	14.23	8.76	8.87	Nov.	12.23	7.96	9.08	
May	11.68	13.34	8.50	9.56	Dec.	12.83	8.26	8.72	
June	12.02	12.70	8.38		Average for Year	12.11	11.44	8.66	
July	13.11	12.26	8.85						

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of:	ON HAND 1937	ON HAND 1938*	ON HAND 1939	AFLOAT 1937	AFLOAT 1938	AFLOAT 1939	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938*	ON HAND AND AFLOAT 1939
Jan.	204,436	276,497	237,826	55,096	57,356	48,210	259,532	333,853	286,036
Feb.	195,692	292,067	231,475	53,538	47,459	55,814	249,230	339,526	287,289
Mar.	192,980	301,762	205,936	56,994	41,882	55,981	249,974	343,644	261,917
Apr.	176,289	303,901	190,896	72,530	39,071	57,918	248,819	342,972	248,814
May	175,273	300,907		58,542	32,859		233,815	333,766	
June	172,056	294,796		57,215	32,079		229,271	326,875	
July	167,094	282,785		75,779	40,400		242,873	323,185	
Aug.	174,195	273,841		80,439	47,772		254,634	321,613	
Sept.	186,193	268,094		83,288	48,927		269,481	317,021	
Oct.	200,025	259,074		80,653	50,162		280,678	310,136	
Nov.	222,707	242,592		81,302	51,114		304,009	293,706	
Dec.	262,204	231,500		63,099	45,105		325,303	276,605	

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1937	London 1938	London 1939	Liverpool 1937	Liverpool 1938	Liverpool 1939
January	29,005	40,203	51,420	41,895	21,711	28,789
February	26,508	46,596	48,312	37,078	24,737	26,784
March	21,292	50,233	46,768	30,622	26,220	24,996
April	21,128	54,296	44,760	27,443	28,277	23,742
May	21,351	57,194		25,081	29,862	
June	21,964	60,307		21,258	31,837	
July	22,589	62,236		19,424	32,825	
August	25,211	65,113		19,817	34,315	
September	28,462	63,321		21,190	34,645	
October	30,465	59,609		21,327	33,483	
November	33,304	57,794		21,399	32,116	
December	35,633	55,668		21,978	31,012	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [3]	Holland	Para and Manaos
At end of 1938					
April	40,614	45,008	4,812	155	1,083
May	40,598	45,426	4,876	169	816
June	44,729	49,290	4,488	190	904*
July	45,529	52,081	5,014	711	944
August	41,002	49,922	4,659	672	1,032
September	35,386	53,815	5,339	662	1,599
October	34,901	54,720	4,916	669	1,796*
November	31,255	54,283	4,409	349	2,267
December	27,084	57,800	6,120	268	1,864
At end of 1939					
January	30,975	59,155	4,827	198	1,557
February	28,559	59,399	4,318	183	1,826
March	23,255	58,005	3,389		1,457

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of:	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
1938				
March	41,882	44,700	22,418	109,000
April	39,071	42,960	31,969	114,000
May	32,859	40,600	20,541	94,000
June	32,079	42,580	17,341	92,000
July	40,400	39,150	25,450	105,000
August	47,772	34,500	18,728	101,000
September	48,927	29,200	17,873	96,000
October	51,062	26,100	21,838	99,000
November	51,114	26,700	14,186	92,000
December	45,105	26,800	8,095	80,000
1939				
January	48,210	27,900	28,890	105,000
February	55,814	28,300	21,886	106,000
March	55,981	27,000	19,019	102,000
April	57,918	28,000	29,918	97,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1934	1935	1936	1937*	1938*	1939
January	661,948	698,153	600,479	454,249	549,762	497,665
February	663,308	686,195	599,355	445,265	565,833	479,578
March	666,382	678,809	583,318	447,856	586,666	460,723
April	658,796	677,006	567,172	428,249	586,291	436,252
May	689,239	677,569	541,871	413,134	568,158	.....
June	672,804	671,525	520,255	434,250	573,136	.....
July	676,200	679,061	519,074	445,782	580,654	.....
August	674,702	680,644	500,520	457,462	565,394	.....
September	694,361	661,509	493,585	470,768	551,447	.....
October	680,616	655,000	486,159	479,398	540,976	.....
November	684,408	617,300	466,491	493,266	512,196	.....
December	705,975	613,987	466,576	545,533	482,852	.....
Monthly Avge.	677,395	666,397	528,738	460,022	555,280	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	11,004	6,635	13,437	13,355	11,376	15,565	7,532	14,062
Apr.-June	12,980	14,412	13,565	12,597	14,892	15,834	8,358	
July-Sept.	9,245	14,707	9,822	11,312	14,914	12,207	11,240	
Oct.-Dec.	6,856	9,550	10,406	12,099	14,858	9,704	13,052	
Total	40,085	45,304	47,230	49,363	56,040	53,310	40,182	

Shipment Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,760	6,981	10,730	11,154	10,554	14,143	7,534	12,484
Apr.-June	18,021	15,139	14,998	13,473	15,940	15,741	10,363	
July-Sept.	8,141	13,707	11,648	13,489	14,037	13,106	11,748	
Oct.-Dec.	5,329	8,265	9,310	12,066	12,855	10,495	12,685	
Total	40,251	44,092	46,686	50,182	53,386	53,485	42,330	

Inventory Figures [2]

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,878	7,290	11,651	11,675	8,762	12,004	10,521	10,109
Apr.-June	4,999	6,615	10,219	10,755	7,556	12,081	8,470	
July-Sept.	6,096	7,595	8,419	8,288	8,690	11,200	8,022	
Oct.-Dec.	7,644	8,888	9,455	8,196	10,717	10,383	8,451	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
Apr.	5,525	2,660	4,211	5,362	3,143	4,356	12,178	10,141	9,998
May	5,161	2,663		5,183	3,291		12,142	9,521	
June	5,149	3,036		5,197	3,929		12,081	8,470	

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	10,721	6,230	12,823	12,553	11,891	15,831	7,314	12,248
Apr.-June	11,913	13,001	13,191	11,631	14,624	15,413	7,380	
July-Sept.	8,286	14,356	10,321	11,270	15,320	12,038	10,794	
Oct.-Dec.	5,970	9,000	9,891	12,425	15,201	9,092	12,360	
Total	36,890	42,587	46,226	47,879	57,036	52,374	37,848	

Shipment Figures on Quarterly Basis

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,918	6,539	10,640	11,252	11,367	14,606	7,387	11,286
Apr.-June	16,271	13,292	14,553	11,928	15,113	15,495	9,564	
July-Sept.	7,761	13,370	11,545	13,251	15,069	12,901	11,243	
Oct.-Dec.	4,961	8,189	8,306	11,636	12,874	9,765	12,099	
Total	37,911	41,390	45,044	48,067	54,423	52,767	40,239	

Inventory Figures [2]

Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,448	6,369	10,244	10,406	8,660	11,993	10,547	8,901
Apr.-June	5,174	6,097	8,795	10,050	8,075	11,833	8,337	
July-Sept.	5,753	7,008	7,639	7,565	8,595	11,326	7,859	
Oct.-Dec.	6,749	7,815	9,180	8,231	10,945	10,312	8,166	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
Apr.	5,669	2,258	3,841	5,365	2,860	3,927	12,309	9,917	8,837
May	4,993	2,325		5,066	2,974		12,197	9,265	
June	4,751	2,797		5,064	3,730		11,833	8,337	

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.
* Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,124
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,635	2,000,985	488,650	166,142	125,081	41,061	2,655,777
1938*							
Oct.	209,512	187,494	22,018	5,774	5,412	362	215,286
Nov.	372,413	320,344	52,069	17,992	15,423	2,569	390,405
Dec.	388,346	326,006	62,340	18,670	15,518	3,152	407,016
1939							
Jan.	339,152	280,033*	59,119*	14,794	11,404	3,390	353,946
Feb.	297,841	239,980*	57,861*	14,300	10,914	3,386	312,141
Mar.	371,940	299,703	72,237	17,549	12,689	4,860	389,489
Apr.	337,372	273,409	63,963	16,891	12,791	4,100	354,263
May	.....	.....	.....	.....	.....	.....	.....
June	.....	.....	.....	.....	.....	.....	.....

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]								NETHERLAND INDIES [4]						
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [3]	Sarawak [3]	British North Borneo [3]	Siam [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	37,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	32,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	35,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	38,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,294	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1938:															
Jan.	47,986	17,078	30,908	5,222	1,379	3,485	1,307	2,897	4,476	9,283	12,708	6,088	878	1,538	80,169
Feb.	48,899	11,874	37,025	5,216	1,409	8	918	3,266	6,391	8,777	12,154	3,070	1,542	1,032	80,808
Mar.	49,197	15,813	33,384	3,834	1,235	1,564	853	2,837	5,673	10,156	15,447	3,213	1,831	1,322	81,349
Apr.	53,864	9,158	44,706	1,951	1,327	1,728	1,158	1,583	5,967	10,081	12,434	3,647	1,004	774	86,360
May	38,245	10,325	27,920	2,833	1,470	1,648	815	2,507	4,575	7,515	9,944	3,118	1,053	904	64,302
June	42,258	14,394	27,864	3,693	1,318	2,441	643	3,904	4,519	7,788	12,120	4,776	718	818	70,602
July	43,689	18,713	24,976	3,861	1,083	2,057	937	4,710	6,808	8,271	19,955	5,139	625	1,063	79,485
Aug.	47,246	13,735	33,511	4,401	953	965	728	4,793	4,757	7,339	11,006	3,840	1,050	1,074	74,417
Sept.	40,992	10,586	30,406	3,990	1,036	756	284	3,893	4,026	7,052	9,092	8,139	758	1,292	70,724
Oct.	42,294	16,599	25,695	4,893	1,111	1,612	1,075	4,438	4,486	8,229	17,166	3,638	1,796	1,092	75,231
Nov.	39,340	10,219	29,121	6,422	1,271	929	567	3,223	3,975	5,678	9,568	4,035	1,159	990	66,938
Dec.	32,901	7,607	25,294	3,212	1,586	599	227	3,029	1,873	4,332	4,315	9,815	2,205	1,021	57,508
1939:															
Jan.	43,332	19,049	24,283	7,237	1,879	2,342	1,604	2,918	6,787	11,261	20,630	4,739	1,708	1,200*	86,588
Feb.	43,084	13,889	29,195	5,575	1,565	1,484	664	5,606	4,833	8,410	11,658	5,659	1,056	1,200*	76,905
Mar.	43,259	14,035	29,224	3,642	1,406	1,177	344	5,401	5,361	8,084	14,428	3,907	1,300*	1,200*	75,474
Apr.	43,668	13,996	29,672	2,246	1,153	2,446	1,687	2,651	5,321	9,250	13,691	2,562	1,200*	1,200*	73,079
May	42,214	13,432	28,782												

All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,883	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,773	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1938:															
Jan.	45,596	15,458	4,769	6,314	1,789	4,933	1,809	693	574	1,257	300	1,239	200*	1,102	86,033
Feb.	40,977	16,505	5,456	6,959	615	3,172	2,000	2,341	578	974	534	1,114	200*	1,771	83,196
Mar.	42,075	15,911	4,845	10,768	2,123	6,220	1,365	2,162	1,043	961	342	1,088	200*	1,324	90,427
Apr.	31,870	14,653	5,757	6,497	999	5,454	2,397	4,281	640	904	449	971	200*	920	75,992
May	27,809	14,675	5,169	9,595	2,545	3,327	2,422	4,163	1,041	1,137	419	1,283	200*	957	74,742
June	26,429	14,053	4,542	7,478	3,243	2,145	2,399	505	805	853	663	1,149	200*	988	65,452
July	22,209	12,678	5,433	6,927	2,685	3,099	3,641	541	1,215	1,106	528	1,151	200*	635	62,048
Aug.	31,494	12,891	3,662	7,190	1,832	2,033	2,078	739	1,182	1,238	259	965	200*	595	66,358
Sept.	34,436	8,100	5,094	7,390	1,405	3,584	1,799	1,725	1,779	519	385	1,830	200*	608	68,854
Oct.	33,830	3,085	3,791	6,326	3,139	3,204	3,921	2,000*	1,780	848	420	3,022	200*	9	65,575
Nov.	32,567	936	5,322	7,275	3,123	4,665	1,984	4,000*	660	636	530	1,209	200*	379	63,486
Dec.	37,051	4,134	5,820	7,481	2,198	4,000	2,355	2,500*	647	876	263	1,013	200*	648	69,186
1939:															
Jan.	36,614	814	4,684	7,227	2,867	2,553	2,133	4,000*	910	898	454	1,037	200*	1,131	65,522
Feb.	30,578	4,940	5,315	7,569	1,451	3,263	2,025	2,000*	1,741	1,068	184	858	200*	524	61,716
Mar.	45,286	8,144	4,503	8,036	2,458	4,019	1,525	2,000*	1,316	1,242	368	1,106	200*	500*	80,703
Apr.	31,590	4,886							1,108	853					

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.